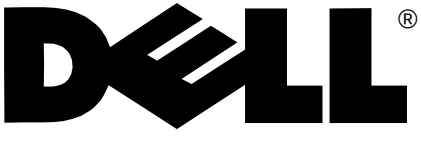
Dell® PowerEdge® 6100/200 System

INSTALLATION AND TROUBLESHOOTING GUIDE



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Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

When Working Inside the Computer

WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer.

WARNING: Before a trained service technician accesses the inside of the computer, any and all power supplies must be disconnected from their power source, and the cables to the power supplies must also be disconnected. If this computer has more than one power supply, disconnect both power supply cords before servicing to avoid electrical shock.

Before taking the covers off of the computer, perform the following steps in the sequence indicated:

1. **Turn off the computer and any peripherals.**
2. **Disconnect the computer and peripherals from their power sources. Also, disconnect any telephone or telecommunications lines from the computer.**

   Doing so reduces the potential for personal injury or shock.
3. **Touch an unpainted metal surface on the computer chassis, such as the power supply, before touching anything inside the computer.**

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

In addition, take note of these safety guidelines when appropriate:

- To help avoid possible damage to the system board, wait five seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.
- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside the computer. To prevent static damage, discharge static electricity from your body before you touch any of the computer's electronic components, such as the

microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

In addition to the preceding precautions, you can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component's antistatic packing material until you are ready to install the component in the computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following caution appears throughout this document to remind you of these precautions:

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

When Using the Computer System

As you use the computer system, observe the following safety guidelines:

- Be sure the monitor and attached peripherals are electrically rated to operate with the alternating current (AC) power available in your location.
- To help prevent electric shock, plug the computer and peripheral power cables into properly grounded power sources. These cables are equipped with 3-prong plugs to ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.
- To help protect the computer system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply.
- Be sure nothing rests on the computer system's cables and that the cables are not located where they can be stepped on or tripped over.
- Do not spill food or liquids on the computer. If the computer gets wet, see Chapter 7, "Checking Inside the Computer."
- Do not push any objects into the openings of the computer. Doing so can cause fire or electric shock by shorting out interior components.
- Keep the computer away from radiators and heat sources. Also, do not block cooling vents. Avoid placing loose papers underneath the computer; do not place the computer in a closed-in wall unit or on a rug.

Preface

About This Guide

This guide provides directions for trained service technicians who are installing system upgrade options in a Dell PowerEdge 6100/200 computer system or are troubleshooting problems that have temporarily disabled a system. Before calling for technical assistance, follow the recommended procedure(s) in this guide to solve most hardware and software problems yourself.

- Chapter 1, "Introduction," provides a brief overview of system service features.
- Everyone should read Chapter 2, "Checking the Basics," for some initial checks and procedures that can be used to solve basic computer problems. It also directs you to the appropriate chapter in this guide for more detailed troubleshooting information and procedures to solve more complex problems.
- Whenever you receive an error message or code, you should read Chapter 3, "Messages and Codes." This chapter discusses system messages, system beep codes, warning messages, diagnostics messages, Dell Hardware Instrumentation Package (HIP) alert log messages, and small computer system interface (SCSI) hard-disk drive indicators.
- If you suspect that the problems are software-related, or you are still having problems after testing the computer's hardware, read Chapter 4, "Finding Software Solutions." It provides some general guidelines for analyzing software problems.
- For hardware-related problems, read Chapter 5, "Running the System Diagnostics." Chapter 6, "Checking the Equipment," and Chapter 7, "Checking Inside the Computer," provide troubleshooting procedures for equipment connected to the input/output (I/O) panel of the computer and components inside the computer, respectively. Chapter 7 also provides information on removing the computer covers and front bezel.
- Chapter 8, "Installing System Board Options," Chapter 9, "Installing Drives in the External Bays," and Chapter 10, "Installing Drives in the Internal Bays," are intended for technicians who want to install or remove options inside the computer, such as single in-line memory modules (SIMMs), expansion cards, or SCSI devices.
- Chapter 11, "Getting Help," describes the help tools Dell provides to assist you should you have a problem with the computer. It also explains how and when to call Dell for technical assistance.
- Make a copy of the checklist in Appendix A, "Diagnostics Checklist," and fill it out as you perform the troubleshooting procedures. If you need to call Dell for technical assistance, use the completed checklist to tell the support technician what procedures you performed to better help the Dell technician give you assistance. If you must return a piece of hardware to Dell, include a completed checklist.
- Appendix B, "Diagnostic Video Tests," discusses the tests for the Video Test Group in the system diagnostics to help you test the monitor.
- Appendix C, "Jumpers, Switches, and Connectors," is intended for technicians who are troubleshooting the system or adding internal options and need to change jumper or switch settings on the system board or microprocessor modules, need to identify connectors on the various boards and modules, or need to disable a forgotten password.
- A table of the abbreviations and acronyms used throughout this guide and in other Dell system documentation precedes the index.

Other Documentation You May Need

You may need to reference the following documentation when performing the procedures in this guide:

- The *Dell PowerEdge 6100/200 System User's Guide,* which describes system features and technical specifications, SCSI device drivers, the system setup program, software support, and the system configuration utility.
- The Intel LANDesk Server Manager software, which includes a CD containing the server manager software and the following documents: *LANDesk Server Manager Setup Guide, LANDesk Server Manager User's Guide, LANDesk Server Control Installation and User's Guide,* and *LANDesk Server Monitor Module Installation and User's Guide.*
- The *Dell Hardware Instrumentation Package for Intel LANDesk Server Manager User's Guide,* which provides installation and configuration procedures as well as the alert messages issued by this server management software.
- The *Using the Dell Server Assistant CD* document provides instructions for using the *Dell Server Assistant* CD.

You may also have one or more of the following documents:

- The *Dell PowerEdge 4100 and 6100 Systems Rack Kit Installation Guide,* which provides detailed instructions for installing the system in a rack.
- The following documents accompany the Dell PowerEdge Expandable RAID Controller: *Dell PowerEdge Expandable RAID Controller User's Guide, Dell PowerEdge Expandable RAID Controller Client User's Guide, Dell PowerEdge Expandable RAID Controller General Alert Server User's Guide,* and *Dell PowerEdge Expandable RAID Controller Battery Backup Module User's Guide.*
- Operating system documentation is included with the system if you ordered the operating system software from Dell. This documentation describes how to install (if necessary), configure, and use the operating system software.
- Documentation is included with any options you purchase separately from the system, such as the Dell PowerEdge Expandable RAID Controller host adapter. This documentation includes information that you need to configure and install these options in the Dell computer. Installation instructions for the options are included in the system documentation.
- Technical information files—sometimes called "readme" files—may be installed on the hard-disk drive to provide last-minute updates about technical changes to the system or advanced technical reference material intended for experienced users or technicians.

NOTE: Documentation updates are sometimes included with the system to describe changes to the system or software. Always read these updates ***before*** *consulting any other documentation because the updates often contain information that supersedes the information in the other documents.*

Notational Conventions

The following subsections list notational conventions used in this document.

Warnings, Cautions, and Notes

Throughout this guide, there may be blocks of text printed in bold type within boxes or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

NOTE: A NOTE indicates important information that helps you make better use of the computer system.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

- *Keycaps*, the labeling that appears on the keys on a keyboard, are enclosed in angle brackets.

  Example: <Enter>

- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

  Example: <Ctrl><Alt><Enter>

- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

  Example: "Use the **format** command to . . . ."

  In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

  Example: "Type `format a:` to format the diskette in drive A."

- *Filenames* and *directory names* are presented in lowercase bold.

  Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are displayed in lowercase bold; variable parameters (those for which you substitute a value) are displayed in lowercase italics; constant parameters are displayed in lowercase bold. The brackets indicate items that are optional.

  Example: **del** [*drive***:**] [*path*] *filename* [**/p**]

- *Command lines* consist of a command and may include one or more of the command's possible parameters. Command lines are presented in the Courier New font.

  Example: `del c:\myfile.doc`

- *Screen text* is text that appears on the screen of your monitor or display. It can be a system message, for example, or it can be text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in the Courier New font.

  Example: The following message appears on your screen:

  ```
  No boot device available
  ```

  Example: "Type `md c:\dos` and press <Enter>."

- *Variables* are placeholders for which you substitute a value. They are presented in italics.

  Example: SIMM*n* (where *n* represents the SIMM socket designation)

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Chapter 2
Checking the Basics

If a Dell PowerEdge 6100 computer system is not working as expected, start your troubleshooting with the procedures in this chapter. This chapter guides you through some initial checks and procedures that can solve basic computer problems. It can also direct you to the appropriate chapter in this guide for detailed troubleshooting information and procedures to solve more complex problems.

NOTE: When you see the question, "Is the problem resolved?" *in a troubleshooting procedure, perform the operation that caused the problem.*

Backing Up Files

If the system is behaving erratically, back up the files immediately. See the documentation that came with the operating system for instructions on how to back up the files.

Basic Checks

The following procedure leads you through the checks necessary to solve some basic computer problems:

1. **Was an alert message issued by the Dell HIP server management program?**

   The Dell Hardware Instrumentation Package (HIP) server management application program generates warning and failure messages for drive, temperature, fan, and power conditions. These messages appear in the simple network management protocol (SNMP) trap log file. To see the trap log, select any enterprise under the SNMP trap log icon. More information about the Alert Log window and options is provided in the Dell HIP online help.

   Yes. Go to "Alert Log Messages From the Dell HIP Program" in Chapter 3.

   No. Continue to step 2.

2. **Is the computer wet or damaged?**

   Yes. Go to Chapter 7, "Checking Inside the Computer."

   No. Continue to step 3.

3. **Perform the steps in "Checking Connections and Switches" next in this chapter.**

   Is the problem resolved?

   Yes. The power to the computer system was faulty, or the connections to the computer system were loose. You have fixed the problem.

   No. Continue to step 4.

4. **Perform the steps in "Look and Listen" later in this chapter.**

   Did the computer system complete the boot routine?

   Yes. Continue to step 5.

   No. A serious malfunction may have occurred. Go to Chapter 11, "Getting Help."

5. **Did you receive a system message or beep code?**

   Yes. Go to Chapter 3, "Messages and Codes."

   No. Continue to step 6.

6. **Verify the settings in the system setup program as explained in "The System Setup Program" later in this chapter.**

   Is the problem resolved?

   Yes. The system configuration information was incorrect. You have fixed the problem.

   No. Continue to step 7.

7. **Run the system diagnostics as described in Chapter 5.**

Checking Connections and Switches

Improperly set switches and controls and loose or improperly connected cables are the most likely source of problems for the computer, monitor, or other peripherals (such as a printer, keyboard, mouse, or other external equipment). A quick check of all the switches, controls, and cable connections can easily solve these problems. Figure 2-1 shows the back panel connections on the computer. Figure 2-2 shows the switches and controls on the front panel of the computer.

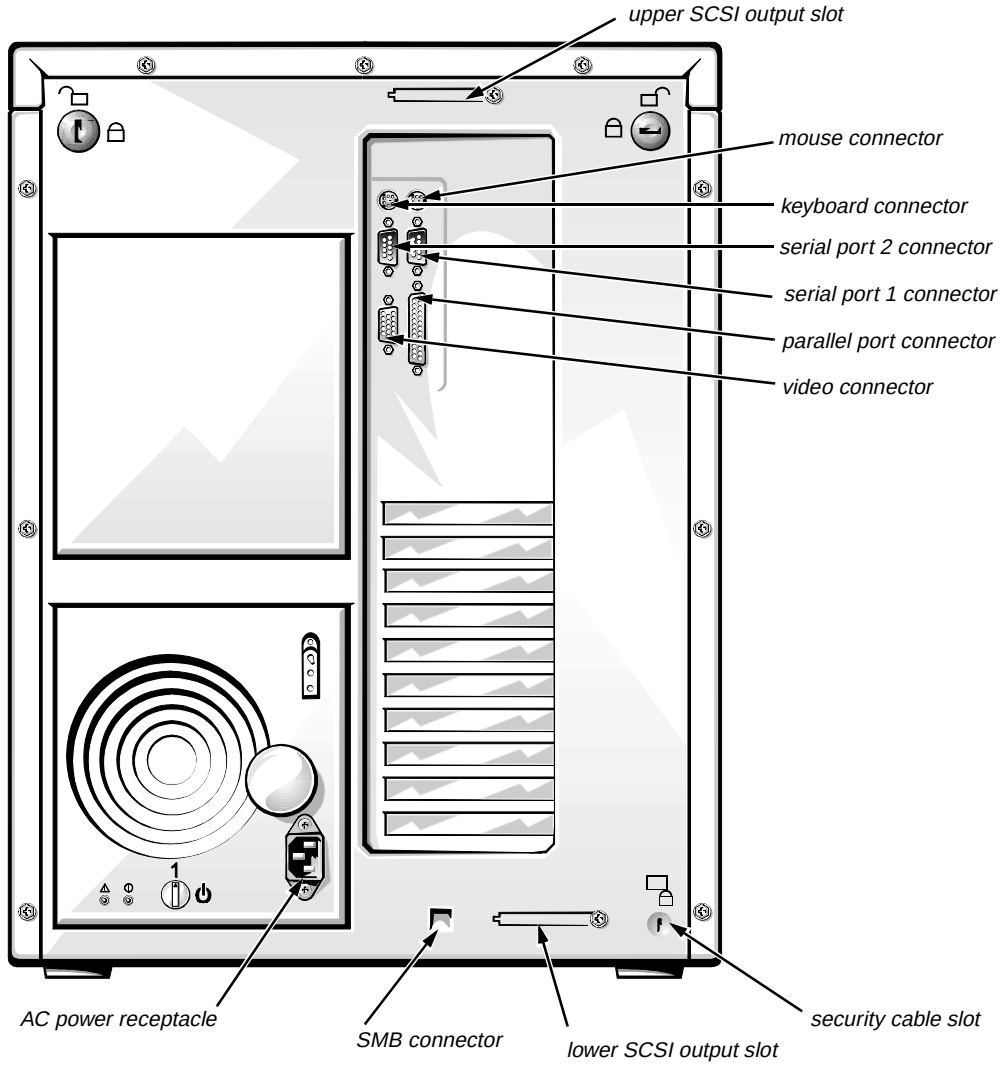


Figure 2-1. Back Panel Features

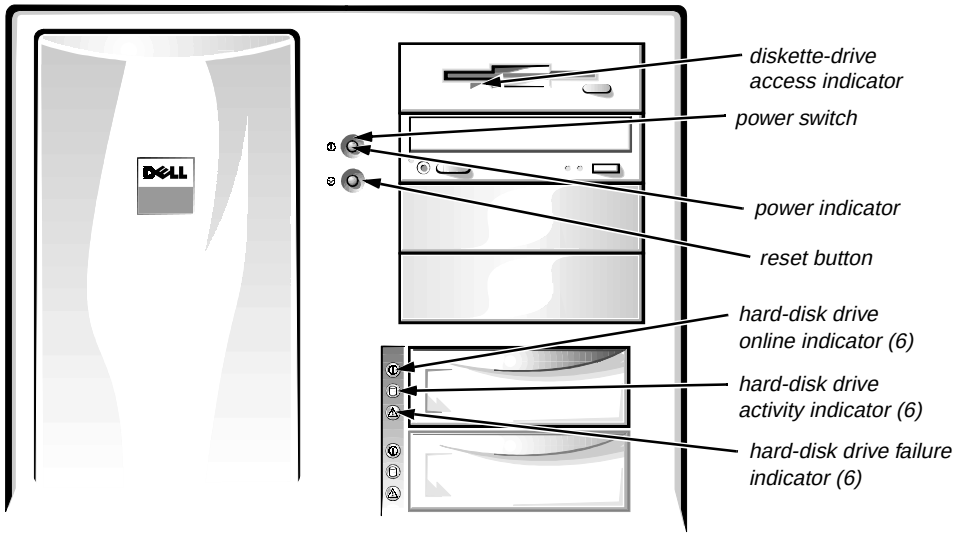


Figure 2-2. Front Panel Switches and Controls

Complete the following procedure to check all the connections and switches:

1. **Turn off the system, including any attached peripherals (such as the monitor, keyboard, printer, external drives, scanners, or plotters). Disconnect all the alternating current (AC) power cables from their power sources.**
2. **If the computer is connected to a power strip, turn off the power strip and turn it on again.**

   Is the power strip getting power?

   Yes. Go to step 5.

   No. Continue to step 3.
3. **Plug the power strip into another electrical outlet.**

   Is the power strip getting power?

   Yes. The original electrical outlet probably does not function. Use a different electrical outlet.

   No. Continue to step 4.
4. **Plug a lamp that you know works into the electrical outlet.**

   Does the lamp get power?

   Yes. The power strip is probably not functioning properly. Get another power strip.

   No. Continue to step 5.
5. **Reconnect the system, including any peripherals, to AC power.**

   Make sure that all connections fit tightly together.
6. **Turn on the system.**

   Is the problem resolved?

   Yes. The connections were loose. You have fixed the problem.

   No. Continue to step 7.
7. **Is the monitor operating properly?**

   Yes. Continue to step 8.

   No. Go to "Troubleshooting the Monitor" in Chapter 6.

8. Is the keyboard operating properly?

Yes. Continue to step 9.

No. Go to "Troubleshooting the Keyboard" in Chapter 6.

9. Is the mouse or printer operating properly?

Yes. Continue with "Look and Listen" next in this chapter.

No. Go to "Troubleshooting I/O Ports" in Chapter 6.

Look and Listen

Looking at and listening to the system is important in determining the source of a problem. Look and listen for the indications described in Table 2-1.

Table 2-1. Boot Routine Indications

Look/Listen for:	Action
An error message	See Chapter 3, "Messages and Codes."
Alert messages from the Dell HIP software	The server management software has detected a problem inside the computer. See "Alert Log Messages From the Dell HIP Program" in Chapter 3.
The monitor's power indicator	Most monitors have a power indicator (usually on the front bezel). If the monitor's power indicator does not come on, see "Troubleshooting the Monitor" in Chapter 6.
The keyboard indicators	Most keyboards have one or more indicators (usually in the upper-right corner). Press the <Num Lock> key, the <Caps Lock> key, or the <Scroll Lock> key to toggle their respective keyboard indicators on and off. If the indicators do not light up, see "Troubleshooting the Keyboard" in Chapter 6.
The diskette-drive access indicator	The diskette-drive access indicator should quickly flash on and off when you access data on the diskette drive. If the diskette-drive access indicator does not light up, see "Troubleshooting the Diskette Drive Subsystem" in Chapter 7.
The hard-disk drive activity indicator	The hard-disk drive activity indicators should quickly flash on and off when you access data on the hard-disk drives. On a system running the Microsoft® Windows NT® operating system, you can test the drive by opening Windows Explorer and clicking on the icon for drive C. If the hard-disk drive access indicator does not come on, see "Troubleshooting SCSI Hard-Disk Drives" in Chapter 7.
A series of beeps	See Chapter 3, "Messages and Codes."

Table 2-1. Boot Routine Indications *(continued)*

Look/Listen for:	Action
An unfamiliar constant scraping or grinding sound when you access a drive	Make sure the sound is not caused by the application program you are running. The sound could be caused by a hardware malfunction. See Chapter 11, "Getting Help," for instructions on getting technical assistance from Dell.
The absence of a familiar sound	When you turn on the system, you should hear the hard-disk drives spin up, and the system tries to access the boot files from the hard-disk drive, the diskette drive, or CD-ROM drive. See Chapter 5, "Running the System Diagnostics." If the system does not boot, see Chapter 11, "Getting Help."

If after looking and listening to the computer you have not resolved the problem, continue with the instructions in "The System Setup Program" next in this chapter.

The System Setup Program

You can easily correct certain system problems by verifying the correct settings in the system setup program. When you boot the system, the system checks the system configuration information and compares it with the current hardware configuration. If the system hardware configuration doesn't match the information recorded by the system setup program, an error message may appear on the screen.

This problem can happen if you changed the system's hardware configuration and forgot to run the system setup program. To correct this problem, enter the system setup program, correct the corresponding system setup category, and reboot the system. See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for detailed instructions on using the system setup program.

The System Configuration Utility

If you are experiencing problems with the system, you may have a conflict between the information stored by the system setup program and the system configuration utility. Although the system configuration utility can read changes from the system setup program, the change is not recorded into nonvolatile random-access memory (NVRAM) until you run the system configuration utility and save the new information. See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for detailed instructions on using the system configuration utility and saving new information.

If after using the system configuration utility you have not resolved the problem, see Chapter 5, "Running the System Diagnostics," in this guide.

Chapter 3
Messages and Codes

Application programs, operating systems, and the computer itself are capable of identifying problems and alerting you to them. When a problem occurs, a message may appear on the monitor screen or a beep code may sound.

Several different types of messages can indicate when the system is not functioning properly:

- System messages
- System beep codes
- Warning messages
- Diagnostics messages
- Alert log messages from the Dell Hardware Instrumentation Package (HIP) program

This chapter lists most of these types of messages. To determine what type of message you have received, read the individual sections.

System Messages

System messages alert you to a possible operating problem or to a conflict between the software and hardware. If you receive a system message, see Table 3-1 for suggestions on resolving any problems indicated by the message.

NOTE: If the system message you received is not listed in Table 3-1, check the documentation for the application program that was running at the time the message appeared and/or the operating system documentation for an explanation of the message and a recommended action.

Table 3-1. System Messages

Code	Message
0002	Primary Boot Device Not Found
0010	Cache Memory Failure, Do Not Enable Cache
0015	Primary Output Device Not Found
0016	Primary Input Device Not Found
0041	EISA ID Mismatch for Slot
0043	EISA Invalid Configuration for Slot
0044	EISA config NOT ASSURED!
0045	EISA Expansion Board Not Ready in Slot
0047	EISA CMOS Configuration Not Set
0048	EISA CMOS Checksum Failure
0049	EISA NVRAM Invalid
0060	Keyboard Is Locked ... Please Unlock It
0070	CMOS Time & Date Not Set

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-1. System Messages *(continued)*

Code	Message
0080	Option ROM has bad checksum
0083	Shadow of PCI ROM Failed
0084	Shadow of EISA ROM Failed
0085	Shadow of ISA ROM Failed
0131	Floppy Drive A:
0132	Floppy Drive B:
0135	Floppy Disk Controller Failure
0140	Shadow of System BIOS Failed
0171	CPU Failure - Slot 1, CPU # 1
0172	CPU Failure - Slot 1, CPU # 2
0173	CPU Failure - Slot 2, CPU # 1
0174	CPU Failure - Slot 2, CPU # 2
0171	Previous CPU Failure - Slot 1, CPU # 1
0172	Previous CPU Failure - Slot 1, CPU # 2
0173	Previous CPU Failure - Slot 2, CPU # 1
0174	Previous CPU Failure - Slot 2, CPU # 2
0175	CPU modules are incompatible

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-1. System Messages *(continued)*

Code	Message
0180	Attempting to boot with failed CPU
0191	CMOS Battery Failed
0195	CMOS System Options Not Set
0198	CMOS Checksum Invalid
0289	System Memory Size Mismatch
0295	Address Line Short Detected
0297	Memory Size Decreased
0299	ECC Error Correction failure
0301	ECC Single bit correction failed, Correction Disabled
0302	ECC Double bit Error
0305	PCI-to-PCI bridge found, IO Queue Depth set to 1,setup value overridden
0310	ECC Memory Size Changed, Bank # 1
0311	ECC Memory Size Changed, Bank # 2
0312	ECC Memory Size Changed, Bank # 3
0370	Keyboard Controller Error
0373	Keyboard Stuck Key Detected

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-1. System Messages *(continued)*

Code	Message
0375	Keyboard and Mouse Swapped
0380	ECC SIMM failure, Board in slot 1 SIMM #
0392	ECC SIMM failure, Board in slot 2 SIMM #
0430	Timer Channel 2 Failure
0440	Gate-A20 Failure
0441	Unexpected Interrupt in Protected Mode
0445	Master Interrupt Controller Error
0446	Slave Interrupt Controller Error
0450	Master DMA Controller Error
0451	Slave DMA Controller Error
0452	DMA Controller Error
0460	Fail-safe Timer NMI Failure
0461	Software Port NMI Failure
0465	Bus Time-out NMI in Slot
0467	Expansion Board NMI in Slot
0501	PCI System Error
0510	PCI Parity Error
0710	System Board Device Resource Conflict

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-1. System Messages *(continued)*

Code	Message
0711	Static Device Resource Conflict
0800	PCI I/O Port Conflict
0801	PCI Memory Conflict
0802	PCI IRQ Conflict
0803	PCI Error Log is Full
0810	Floppy Disk Controller Resource Conflict
0811	Primary IDE Controller Resource Conflict
0812	Secondary IDE Controller Resource Conflict
0815	Parallel Port Resource Conflict
0816	Serial Port 1 Resource Conflict
0817	Serial Port 2 Resource Conflict
0820	Expansion Board Disabled in Slot
0900	NVRAM Checksum Error, NVRAM Cleared
0903	NVRAM Data Invalid, NVRAM Cleared
0905	NVRAM Cleared By Jumper
0982	I/O Expansion Board NMI in Slot
0984	Expansion Board Disabled in Slot
0985	Fail-safe Timer NMI

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-1. System Messages *(continued)*

Code	Message
0986	System Reset caused by Watchdog Timer
0987	Bus Time-out NMI in Slot
NA	Power supply paralleling board firmware download failed System backplane firmware download failed

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

System Beep Codes

When errors occur during a boot routine that cannot be reported on the monitor, the computer may emit a series of beeps that identify the problem. The *beep code* is a pattern of beeps. For example, four beeps means the timer is not operational. This information is valuable to the Dell support staff if you need to call for technical assistance.

When a beep code is emitted, write it down on a copy of the Diagnostics Checklist found in Appendix A, and then look it up in Table 3-2. If you are unable to resolve the problem by looking up the meaning of the beep code, use the system diagnostics to identify a more serious cause. If you are still unable to resolve the problem, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Table 3-2. System Beep Codes

Beep Code	Cause
1	Refresh failure
2	Parity cannot be reset
3	First 64 KB memory failure
4	Timer not operational
5	Microprocessor failure
6	8042 Gate A20 is off (v_mode)
7	Exception interrupt error
8	Display memory read/write error
9	ROM checksum error
10	Shutdown reg. read/write error
11	I2C Error

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Warning Messages

A warning message alerts you to a possible problem and asks you to do something before execution continues. For example, before you format a diskette, a message may warn you that you may lose all data on the diskette as a way to protect against inadvertently erasing or writing over the data. These warning messages usually interrupt the procedure and require you to respond by typing a y (yes) or n (no).

NOTE: Warning messages are generated by either the application programs or the operating system. See Chapter 4, "Finding Software Solutions," and the documentation that accompanied the operating system and application programs.

Diagnostics Messages

When you run a test group or subtest in the system diagnostics, an error message may result. These particular error messages are not covered in this chapter. Record the message on a copy of the Diagnostics Checklist found in Appendix A; then see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Alert Log Messages From the Dell HIP Program

The Dell HIP server management application program generates alert messages that can be configured to appear in the simple network management protocol (SNMP) trap log file. To see the trap log, select any enterprise under the SNMP trap log icon. More information about the Alert Log window and options is provided in the Dell HIP online help and the Dell HIP *User's Guide*.

Alert log messages consist of information, status, warning, and failure messages for drive, temperature, fan, and power conditions. They can assist you with identifying a problem and may provide you with information to help you resolve the problem. Alert log and other messages are explained in the Dell HIP online help.

SCSI Hard-Disk Drive Indicator Codes

The three light-emitting diode (LED) indicators (see Figure 2-2) adjacent to each of the six small computer system interface (SCSI) hard-disk drive bays provide information on the status of the SCSI hard-disk drives. The SCSI backplane firmware controls the drive online and drive fault indicators, while the drive access indicator is usually controlled by the drive itself.

Table 3-3 lists the drive indicator patterns established by the SCSI backplane firmware. Different patterns are displayed as drive events occur in the system. For example, in the event of a hard-disk drive failure, the "drive failed" pattern appears. After the drive is selected for removal, the "drive being prepared for removal" pattern appears, followed by the "drive ready for insertion or removal" pattern. After the replacement drive is installed, the "drive being prepared for operation" pattern appears, and then the "drive online" pattern appears.

Table 3-3. SCSI Hard-Disk Drive Indicator Patterns

Status	Indicator Pattern
Identify drive	All three drive indicators blink simultaneously.
Drive being prepared for removal	The three drive indicators flash sequentially.
Drive ready for insertion or removal	All three indicators are off.
Drive being prepared for operation	The drive online indicator is on; the drive activity indicator may flash briefly.
Drive bay empty	All three indicators are off.
Drive predicted failure	The drive online indicator turns off; the drive fault indicator blinks on briefly each second.
Drive failed	The drive online indicator turns off; the drive fault indicator blinks off briefly each second.
Drive rebuilding	The drive online indicator blinks rapidly.
Drive online	The drive online indicator is on.

Chapter 4
Finding Software Solutions

Because most computers have several application programs installed in addition to the operating system, isolating a software problem can be confusing. Software errors can also appear to be hardware malfunctions at first. Software problems can result from the following circumstances:

- Improper installation or configuration of a program
- Input errors
- Device drivers that may conflict with certain application programs
- Interrupt conflicts between devices

You can confirm that a computer problem is caused by software by running the System Set Test Group as described in Chapter 5, "Running the System Diagnostics." If all tests in the test group complete successfully, the error condition is most likely caused by software.

This chapter provides some general guidelines for analyzing software problems. For detailed troubleshooting information on a particular program, see the documentation that accompanied the software or consult the support service for the software.

Installing and Configuring Software

You should check newly acquired programs and files for viruses with virus-scanning software before installing the programs on the computer's hard-disk drive. Viruses, which are pieces of code that can replicate themselves, can quickly use all available system memory, damage and/or destroy data stored on the hard-disk drive, and permanently affect the performance of the programs they infect. Several commercial virus-scanning programs are available for purchase, and most bulletin board services (BBSs) archive freely distributed virus-scanning programs that you can download with a modem.

Before installing a program, you should read any program documentation to learn how the program works, what hardware it requires, and what its defaults are. A program usually includes installation instructions in its accompanying documentation and a software installation routine on its program diskettes or CD(s).

The software installation routine assists users in transferring the appropriate program files to the computer's hard-disk drive. Installation instructions may provide details about how to configure the operating system to successfully run the program. You should always read the installation instructions before running a program's installation routine.

When you run the installation routine, be prepared to respond to prompts for information about how the computer's operating system is configured, what type of computer you have, and what peripherals are connected to the computer.

Using Software

The following subsections discuss errors that can occur as a result of software operation or configuration.

Error Messages

Error messages can be produced by an application program, the operating system, or the computer. Chapter 3, "Messages and Codes," discusses the error messages that are generated by the system. If you receive an error message that is not listed in Chapter 3, check the operating system or application program documentation.

Input Errors

If a specific key or set of keys is pressed at the wrong time, a program may give you unexpected results. See the documentation that came with the application program to make sure that the values or characters you are entering are valid.

Make sure that the operating environment is set up to accommodate the programs you use. Keep in mind that whenever you change the parameters of the computer's operating environment, you may affect the successful operation of the programs. Sometimes, after modifying the operating environment, you may need to reinstall a program that no longer runs properly.

Program Conflicts

Some programs may leave portions of their setup information behind, even though you have exited from them. As a result, other programs cannot run. Rebooting the system can confirm whether these programs are the cause of the problem.

There are also programs that use specialized subroutines called *device drivers* that can also cause problems with the computer system. For example, a variation in the way the data is sent to the monitor may require a special screen driver program that *expects* a certain kind of video mode or monitor. In such cases, you may have to develop an alternative method of running that particular program—the creation of a boot file made especially for that program, for example. Call the support service for the software you are using to help you with this problem.

Avoiding Interrupt Assignment Conflicts

Problems can arise if two devices attempt to use the same interrupt request (IRQ) line. To avoid this type of conflict, check the documentation for the default IRQ line setting for each installed expansion card. Then consult Table 4-1 to configure the card for one of the available IRQ lines.

Table 4-1. Default IRQ Line Assignments

IRQ Line	Used/Available
IRQ0	Used by the system timer
IRQ1	Used by the keyboard to signal that the output buffer is full
IRQ2	Used by interrupt controller 1 to enable IRQ8 through IRQ15
IRQ3	Used by serial port 2
IRQ4	Used by serial port 1
IRQ5	Available
IRQ6	Used by the diskette/tape drive controller
IRQ7	Used by the parallel port
IRQ8	Used by the RTC
IRQ9	Available
IRQ10	Available
IRQ11	Available
IRQ12	Used by the mouse port
IRQ13	Used by the math coprocessor (if applicable)
IRQ14	Available
IRQ15	Available

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Chapter 5
Running the System Diagnostics

Unlike many diagnostic programs, Dell's system diagnostics helps you check the computer's hardware without any additional equipment and without destroying any data. By using the diagnostics, you can have confidence in the computer system's operation. And if you find a problem you cannot solve by yourself, the diagnostic tests can provide you with important information you will need when talking to Dell's service and support personnel.

CAUTION: Use the system diagnostics to test *only* Dell computer systems. Using this program with other computers may cause incorrect computer responses or result in error messages.

Features of the System Diagnostics

The system diagnostics provides a series of menus and options from which you choose particular test groups or subtests. You can also control the sequence in which the tests are run. The diagnostic test groups or subtests also have these helpful features:

- Options that let you run tests individually or collectively
- An option that allows you to choose the number of times a test group or subtest is repeated
- The ability to display or print out test results or to save them in a file
- Options to temporarily suspend testing if an error is detected or to terminate testing when an adjustable error limit is reached
- A menu category called About that briefly describes each test and its parameters
- Status messages that inform you whether test groups or subtests were completed successfully
- Error messages that appear if any problems are detected

When to Use the System Diagnostics

Whenever a major component or device in the computer system does not function properly, you may have a component failure. As long as the microprocessor and the input and output components of the computer system (the monitor, keyboard, or CD-ROM drive) are working, you can use the system diagnostics. If you know what component(s) you need to test, simply select the appropriate diagnostic test group(s) or subtest(s). If you are unsure about the scope of the problem, read the rest of this chapter.

Starting the System Diagnostics

The system diagnostics is run directly from the *Dell Server Assistant* CD. See Chapter 2, "Using the Dell Server Assistant CD" in the system *User's Guide* for more information about the CD.

Follow these steps to run the diagnostics from the *Dell Server Assistant* CD:

1. **Turn on the computer.**
2. **Boot the system from the *Dell Server Assistant* CD.**

   To boot from the CD, insert the CD into the CD-ROM drive and press the reset button. If the system fails to boot, refer to the Dell Server Assistant documentation.
3. **From the Dell Server Assistant main menu, select the Run System Diagnostics option from the Run System Utilities category.**

NOTE: Before you read the rest of this chapter, you may want to start the system diagnostics so you can see it on the screen of the monitor.

When you start the diagnostics, the Dell logo screen appears, followed by a message telling you that the diagnostics is loading. Before the diagnostics loads into memory, a program tests the random-access memory (RAM) that will be used by the diagnostics.

If no errors are found in RAM, the diagnostics loads, and the Diagnostics Menu appears (see Figure 5-1). The menu allows you to run all or specific diagnostic tests or to exit to the Dell Server Assistant main menu.

For a quick check of the system, select the Run Quick Tests option. This option runs only the subtests that do not require user interaction and that do not take a long time to run. Dell recommends that you choose this option first to increase the odds of tracing the source of the problem quickly. For a complete check of the system, select the Run All Tests option. To check a particular area of the system, select the Run Specific Tests option.

To select an option from this menu, highlight the option and press <Enter>, or press the key that corresponds to the highlighted letter in the option you choose.

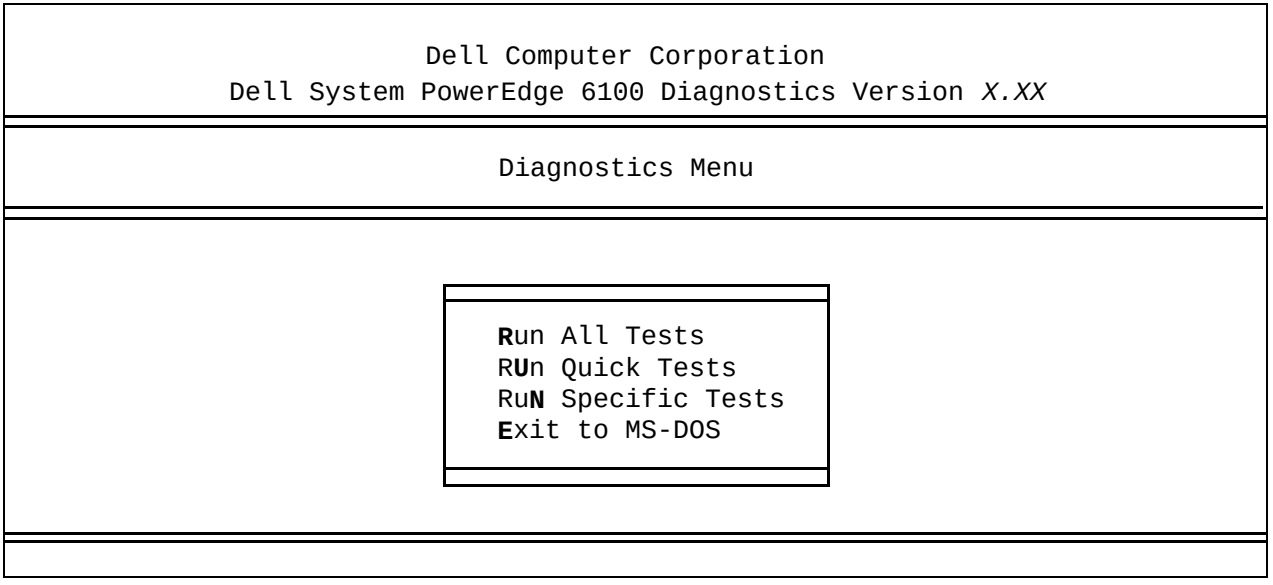


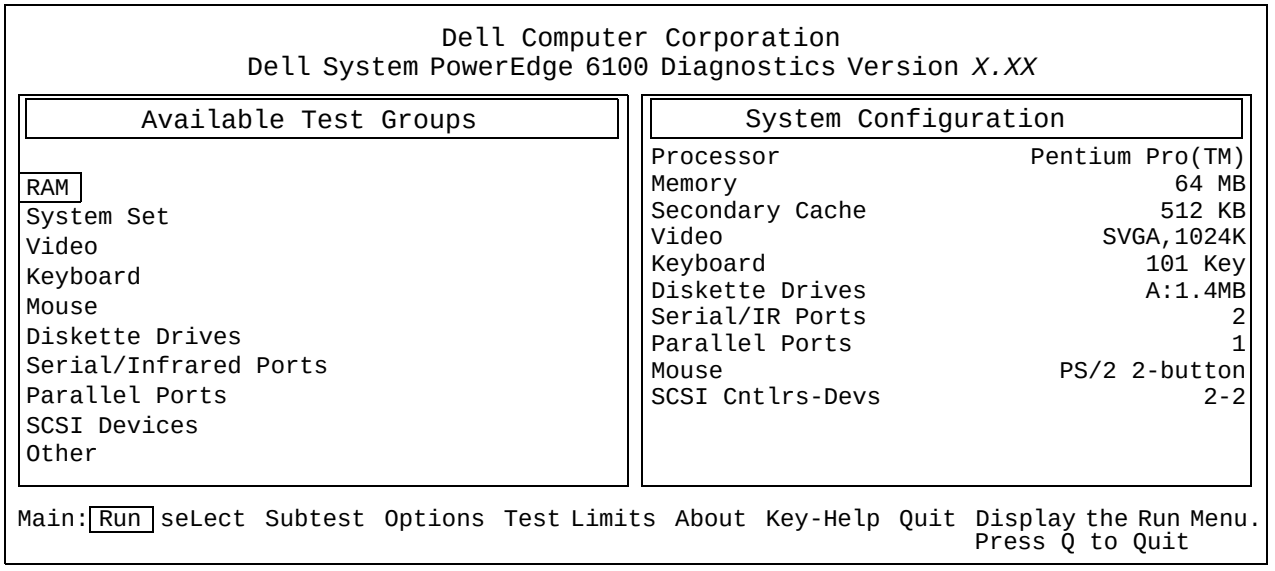
Figure 5-1. Sample Diagnostics Menu

How to Use the System Diagnostics

When you select Run Specific Tests from the Diagnostics Menu, the main screen of the diagnostics appears (see Figure 5-2). The main screen lists the diagnostic test groups, gives information about the configuration of the computer system, and allows you to select categories from a menu. From this screen, you can enter two other types of screens.

Information on the main screen of the diagnostics is presented in the following areas:

- Two lines at the top of the screen identify the diagnostics and give its version number.
- On the left side of the screen, the Available Test Groups area lists the diagnostic test groups in the order they will run if you select All from the Run menu category. Press the up- or down-arrow key to highlight a test group.
- On the right side of the screen, the System Configuration area lists the computer's current hardware settings.
- Two lines at the bottom of the screen make up the menu area. The first line lists the categories you can select; press the left- or right-arrow key to highlight a menu category. The second line gives information about the category currently highlighted.



NOTE: The options displayed on the actual screen should reflect the hardware configuration of your computer system.

Figure 5-2. Sample System Diagnostics Main Screen

Confirming the System Configuration Information

When you boot the system from the *Dell Server Assistant* CD, the system diagnostics checks the system configuration information and displays it in the System Configuration area on the main screen.

The following sources supply this configuration information for the system diagnostics:

- The system configuration information settings (stored in nonvolatile random-access memory [NVRAM]) that you selected while using the system setup program
- Identification tests of the microprocessor, the video controller, the keyboard controller, and other key components
- Basic input/output system (BIOS) configuration information temporarily saved in RAM

Do not be concerned if the System Configuration area does not list the names of all the components or devices you know are part of the computer system. For example, you may not see a printer listed, although you know one is attached to the computer. Instead, the printer is listed as a parallel port. The computer recognizes the parallel port as LPT1, which is an address that tells the computer where to send outgoing information and where to look for incoming information. Because the printer is a parallel communications device, the computer recognizes the printer by its LPT1 address and identifies it as a parallel port.

How to Use the Menu

One of the menu categories is already highlighted. You can move the highlight from one category to another by pressing the left- or right-arrow key. As you move from one menu category to another, a brief explanation of the currently highlighted category appears on the bottom line of the screen.

If you want more information about a test group or subtest, select the About category and press <Enter>. After reading the information, press the <Esc> key to return to the previous screen.

Main Menu Categories

Eight categories are listed in the menu area of the diagnostics main screen: Run, Select, Subtest, Options, Test Limits, About, Key-Help, and Quit. (An additional category, Display the Run Menu, returns you to the Diagnostics Menu described earlier in this chapter.)

NOTE: Before running any test groups or subtests (by selecting Run), you should consider setting global parameters within the Options menu category. They offer you greater control over how the test groups or subtests are run and how their results are reported.

There are two ways to select a menu category:

- Look on the screen to see which letter in the category is capitalized, and type that letter (for example, type `r` to select the Run category).
- Move the highlight to the category you wish to select by pressing the left- or right-arrow key, and then press <Enter>.

Whenever one of the eight categories is selected, additional choices become available.

The following subsections explain the menu categories as listed from left to right in the main screen.

Run

Run displays five categories: One, Selected, All, Key-Help, and Quit Menu. If you select One, all the subtests within the highlighted test group are run. If you choose Selected, only the selected test groups or the subtests that you selected within the test groups are run. If you select All, all of the subtests in all of the test groups are run. (The test groups or subtests are run in the same order as they are listed.)

The Key-Help category displays a list of key controls available for the particular category you have chosen.

The Quit Menu category returns you to the main screen.

Select

Select allows you to select individual test groups to tailor the testing process to your particular needs. You can choose one or more test groups and run them sequentially or individually. When you choose Select, five categories

are displayed: All, One, Clear All, Key-Help, and Quit Menu.

To select all the test groups, press the <Enter> key when All is highlighted in the Select menu.

To select an individual test group, highlight the test group and press the <Spacebar> or highlight One and press <Enter>. Press the up- or down-arrow key to change the highlighted test group.

To reverse a test group selection, highlight the test group and press the <Spacebar>. To clear all selections, select Clear All.

The Key-Help category displays a list of key controls available for the particular category you have chosen. The Quit Menu category returns you to the main screen.

Subtest

Most of the test groups consist of several subtests. Use the Subtest category to select individual subtests within the test group(s).

When you select Subtest, the options displayed are many of the same categories as those on the main screen: Run, Select, Options, Test Limits, About, Key-Help, and Quit Menu. Each of these options is explained in the following subsections.

Run (Under Subtest)

Run in the Subtest menu displays five options: One, Selected, All, Key-Help, and Quit Menu. If you select One, only the highlighted subtest is run. If you select Selected, only the selected subtests are run. If you select All, all of the subtests listed on the screen are run. (The subtests are run in the same order as they are listed.)

The Key-Help option displays a list of key controls available. The Quit Menu option returns you to the previous menu.

Select (Under Subtest)

Select in the Subtest menu allows you to select individual subtests to tailor the testing process to your particular needs. You can choose one or more subtests from the list. When you choose Select, five options are displayed: All, One, Clear All, Key-Help, and Quit Menu.

To select all the subtests, press the <Enter> key when All is highlighted in the Select menu. To select an individual subtest, highlight the subtest and press the <Spacebar> or highlight One and press <Enter>. Press the up- or down-arrow key to highlight a subtest to be selected.

To reverse a subtest selection, highlight the subtest and press the <Spacebar>. To clear all selections, select Clear All.

The Key-Help option displays a list of key controls available. The Quit Menu option returns you to the previous menu.

Options (Under Subtest)

The Options option in the Subtest menu functions the same way as the Options category in the main screen. For information on this option, see “Options” later in this section.

Test Limits (Under Subtest)

The Test Limits option in the Subtest menu functions the same way as the Test Limits category in the main screen. For information on this option, see “Test Limits” later in this section.

About (Under Subtest)

The About option in the Subtest menu displays information about the highlighted subtest.

Key-Help (Under Subtest)

The Key-Help option in the Subtest menu displays a list of key controls available.

Quit Menu (Under Subtest)

The Quit Menu option in the Subtest menu returns you to the main screen.

Options

Table 5-1 lists all of the possible values for each global parameter of the Options menu category from the main screen. A brief description of each parameter follows. To change Options parameters, press the <Spacebar>, the left- and right-arrow keys, or the plus (+) and minus (–) keys.

Number of Times to Repeat Test(s)

This parameter specifies the number of times the tests run when you select Run. To change the default, type in the desired value. If you type `0` (zero), the tests will run indefinitely.

Maximum Errors Allowed

This parameter specifies the maximum number of errors that can occur before testing is stopped. The error count begins from zero each time you run a subtest or test group individually or each time you select All to run all of them. To change the default, type in the desired value. If you type `0` (zero), you are specifying that there be no limit on the number of errors that can occur—testing will not be stopped, regardless of the number of errors.

Pause for User Response

If this parameter value is set to Yes, the diagnostics pauses when one of the following occurs:

- Your interaction is needed to verify the Video Test Group screens or the Keyboard Test Group key functions or other types of interaction such as inserting a diskette.
- The maximum error limit is reached.

If the Pause for User Response parameter is set to No, the diagnostics ignores some subtests that require your interaction; certain subtests can run only if this option is set to Yes because they require user interaction. Use this parameter in situations where you may want to prevent subtests that require user interaction from running—such as when you run the diagnostics overnight.

Table 5-1. Option Parameters

Option Limit	Possible Values
Number of Times to Repeat Test(s)	0001 through 9999, or 0000, which loops indefinitely until you press the <Ctrl> and <Break> keys. The default is 1.
Maximum Errors Allowed	0000 through 9999, where 0000 means that there is no error limit. The default is 1.
Pause for User Response	Yes, No Allows you to decide whether tests will wait for user input. The default is Yes to wait for user input.
Output Device for Status Messages	Display, Printer, File If you have a printer attached to the computer, you can use it to print the status messages, if any, that are generated when a test runs. (The printer must be turned on and in the online mode to print.) If you select File, the messages are printed to a file named **result** in diskette drive A. The default is Display.
Output Device for Error Messages	Display, Printer, File This parameter has the same effect as the Output Device for Status Messages parameter, except that it pertains only to error messages. The default is Display.

Output Device for Status Messages

Ordinarily, all status messages appear only on the screen. This parameter allows you to direct status messages to either a printer or a file, in addition to the screen. If you choose the File option, status messages are written to a file named **result**. This file is automatically created on a diskette in drive A when you run the diagnostics. If the **result** file already exists on the diskette, then new status messages are added to it.

The **result** file is an ordinary American Standard Code for Information Interchange (ASCII) text file. You can access the result file with the MS-DOS® **type** command as follows:

1. **Select Quit to exit the diagnostics and return to the operating system prompt.**
2. **At the operating system prompt, type the following command line and press <Enter>:**

   ```
   type result
   ```

   The contents of the file appear on the screen.

After running particular diagnostic tests and viewing the status messages generated by the tests in the **result** file, you can erase the contents of the file so that it is clear for the next set of messages generated. Otherwise, the next messages are added at the end of the previous ones in the file.

Output Device for Error Messages

Ordinarily, all error messages appear only on the screen. This parameter allows you to direct error messages to either a printer or a file, in addition to the screen. If you choose the File option, error messages are written to the **result** file used for status messages. This file is automatically created on a diskette in drive A when you run the diagnostics. If the **result** file already exists on the diskette, then new error messages are added to it.

The **result** file is an ordinary ASCII text file. You can access and review the **result** file with the MS-DOS **type** command as described in the previous subsection, "Output Device for Status Messages."

After running particular diagnostic tests and viewing the error messages generated by the tests in the **result** file, you can erase the contents of the file so that it is clear for the next set of messages generated. Otherwise, the next messages are added at the end of the previous ones in the file.

Test Limits

NOTE: The diagnostics program sets default limits on all tests. The only reason to change the default would be to limit the amount of testing done.

The RAM Test Group, the Video Test Group, the Diskette Drives Test Group, the Serial/Infrared Ports Test Group, the Parallel Ports Test Group, and the SCSI Devices Test Group allow you to designate limits. Whether you select Test Limits for a highlighted test group (from the main screen) or a subtest (from the Subtest menu), you set the limits for all the subtests in that test group. When you select Test Limits, a new screen appears and the Key Help area lists keys to use with the new screen.

How you change a value for the limits of a test group or subtest depends on the type of parameter associated with it. Different keys are used to change values for different types of parameters. For example, memory address limits specified for the RAM Test Group are changed by typing in numbers over the digits of a given limit or by pressing the plus (+) or minus (–) keys to increase or decrease the given limit. In contrast, to set limits for the Serial/Infrared Ports Test Group, you use the <Spacebar> to toggle between Yes and No.

After you are satisfied with the limits, return to the main screen of the diagnostics by pressing the <Esc> key. The values you selected under Test Limits remain in effect during all the test groups or subtests you run, unless you change them. However, the values are reset to their defaults when you restart the diagnostics.

About

About in the main screen lists all of the subtests for the selected test group and displays information about the subtest that is highlighted.

Key-Help

Key-Help in the main screen always displays a list of key controls available for the particular category you have selected.

Quit

Selecting Quit from the main screen exits the diagnostics and returns you to your operating system environment.

CAUTION: It is important that you quit the diagnostics program correctly because the program writes data to the computer's memory that can cause problems unless properly cleared.

Tests in the System Diagnostics

To troubleshoot components or devices, run the appropriate test (test group or subtest) in the diagnostics. The diagnostics exercises the functional components and devices of the computer system more vigorously and thoroughly than they are exercised during normal operation. The diagnostics is organized by components into test groups and subtests within each test group. Each subtest is designed to detect any errors that may interfere with the normal operation of a specific device of the computer.

NOTE: Some subtests requiring hardware not listed in the System Configuration area of the diagnostics screen appear to run, but they conclude with a status message stating `Component not present (or disabled)`.

Table 5-2 lists the diagnostic test groups, their subtests, and comments concerning their use.

Table 5-2. System Diagnostics Tests

Test Groups	Subtests	Description
RAM	Quick Memory Test Comprehensive Memory Test Cache Controller Test Cache RAM Test	Tests the system RAM and processor cache.
System Set	CMOS Confidence Test EISA Configuration Memory Test DMA Controller Test Real-Time Clock Test Timers Test Interrupt Controller Test Apic Test Apic MP Test Speaker Test	Tests the system board's support chips, DMA controller, computer timer, NVRAM, speaker controller, cache, and EISA configuration RAM chip, as appropriate. For systems with multiprocessors, the Apic Test and the Apic MP Test confirm that the additional microprocessors are operational.
	x87 Calculation Test x87 Duty Cycle Test x87 Error Exception Test	Tests the math coprocessor that is internal to the microprocessor.
Video	Video Memory Test Video Hardware Test Text Mode Character Test Text Mode Color Test Text Mode Pages Test Graphics Mode Test Color Palettes Test Solid Colors Test	Tests the video subsystem and monitor by checking various aspects of video output.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 5-2. System Diagnostics Tests *(continued)*

Test Groups	Subtests	Description
Keyboard	Controller Test Key Sequence Test Interactive Test Stuck Key Test	Tests the keyboard by checking the keyboard controller and by finding keys that stick or respond incorrectly.
Mouse	Mouse Test	Tests the electronic pointing device (bus mouse, serial mouse, trackball, or PS/2 mouse).
Diskette Drives	Change Line Test Seek Test Read Test Write Test	Tests a drive that uses removable diskettes. Also tests the associated interface.
Serial/ Infrared Ports	Baud Rate Test Interrupt Test Internal Transmit Test External Transmit Test	Tests the components through which peripherals that use the serial or infrared ports, such as printers and communications devices, send and receive data.
Parallel Ports	Internal Test External Loopback Test External Interrupt Test Printer Pattern Test	Tests the components through which peripherals that use the parallel port, such as printers and communications devices, send and receive data.
SCSI Devices	Internal Diag. Test Seek Test Read Test Write Test Eject Test	Tests SCSI host adapters and all the SCSI devices attached to them. Also can be used to remove CDs and tape cartridges from SCSI devices and to display information about the types of SCSI devices installed and the resources allocated to them.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Error Messages

When you run a test group or subtest in the diagnostics, error messages may result. These particular error messages are not covered in this chapter because the errors that generate these messages can be resolved only with Dell technical assistance. Record the messages on a copy of the Diagnostics Checklist found in Appendix A, and see Chapter 11, "Getting Help," for instructions on obtaining technical assistance and informing the support technician of these messages.

RAM Test Group

The RAM Test Group subtests check all the directly addressable RAM.

Subtests

The following subtests are available for RAM:

- Quick Memory Test

  The Quick Memory Test performs an address check to determine whether the computer is properly setting and clearing individual bits in RAM and whether the RAM read and write operations are affecting more than one memory address location at one time. This subtest checks all available RAM.

- Comprehensive Memory Test

  The Comprehensive Memory Test performs an address check, as well as the following:

  — Data pattern checks, to look for RAM bits that are stuck high or low, short-circuited data lines, and some data pattern problems that are internal to the memory chips

  — A parity check that verifies the ability of the memory subsystem to detect errors

  — A refresh check, to verify that the dynamic RAM (DRAM) is being recharged properly

- Cache Controller Test

  Confirms the functionality of the computer's cache controller chip.

- Cache RAM Test

  Confirms the functionality of the computer's cache memory.

Why Run a RAM Test?

Faulty memory can cause a variety of problems that may not, at first glance, appear to be happening in RAM. If the computer is displaying one or more of the following symptoms, run the subtests in the RAM Test Group to verify that the memory is not at fault:

- A program is not running as usual, or a proven piece of software appears to malfunction and you confirm that the software itself is not at fault. You can confirm that the software is functioning properly by moving it to another computer and running it there.
- The computer periodically *locks up* (becomes unusable and must be rebooted), especially at different places and times in different programs.
- You get parity errors (any error message that contains the word *parity*) at any time during operation. These errors are usually accompanied by a reference to an *address*—the location of the portion of memory where the error occurred—which you should record on a copy of the Diagnostics Checklist found in Appendix A.
- You receive the `Memory ECC fault detected` message from the Dell Hardware Instrumentation Package (HIP) server management program. See "Alert Log Messages From the Dell HIP Program" in Chapter 3, "Messages and Codes," for more information on this message. See the Dell HIP *User's Guide* for information on the program.

System Set Test Group

The subtests in the System Set Test Group check the computer's basic system board components and verify their related functions.

Subtests

The subtests that constitute the System Set Test Group and the computer functions they confirm follow:

- CMOS Confidence Test

  Checks the NVRAM for accessibility and reliability of data storage by performing a data pattern check and verifying the uniqueness of memory addresses.

- EISA Configuration Memory Test

  Verifies the accessibility and reliability of the RAM on the Extended Industry-Standard Architecture (EISA) configuration RAM chip, which stores the EISA hardware configuration information. On systems without flash RAM, performs a data pattern and address uniqueness test.

- DMA Controller Test

  Tests the direct memory access (DMA) controller and verifies the correct operation of its page and channel registers by writing patterns to the registers.

- Real-Time Clock Test

  Confirms the functionality and accuracy of the computer's real-time clock (RTC).

- Timers Test

  Checks the timers used by the microprocessor for event counting, frequency generation, and other functions. Only the functions that can be activated by software are tested.

- Interrupt Controller Test

  Generates an interrupt on each interrupt request (IRQ) line to verify that devices using that line can communicate with the microprocessor(s) and that the interrupt controllers send the correct memory addresses to the microprocessor(s).

- Speaker Test

  Checks the functionality of the speaker by generating eight tones.

- x87 Calculation Test

  Checks the use of different types of numbers and the math coprocessor's ability to calculate correctly.

- x87 Duty Cycle Test

  Tests the math coprocessor's ability to perform complex mathematical operations.

- x87 Error Exception Test

  Verifies the math coprocessor's ability to handle errors and to send IRQs to the microprocessor.

- Apic Test and Apic MP Test

  For systems with multiprocessors, confirms that the additional microprocessors are operational.

Why Run a System Set Test?

The System Set subtests double-check many system board components, such as the computer's input/output (I/O) circuitry, that are tested by other test groups or subtests in the diagnostics. You should run the System Set Test Group if you are having a problem and cannot isolate the failure or malfunction to a particular system board component.

The System Set Test Group also verifies the proper operation of other computer components, such as the speaker, that are not tested elsewhere in the diagnostics.

The following symptoms usually suggest a problem with a component or subassembly that warrants running a System Set subtest:

- A program is not running as usual, or a proven piece of software appears to malfunction and you confirm that the software itself is not at fault. You can confirm that the software is functioning properly by moving it to another computer and running it there.
- An option card you previously accessed can no longer be accessed.
- You get parity errors or page fault failures (any error message that contains the words *parity* or *page fault*) at any time during operation. These errors are usually accompanied by a reference to an address, which you should record on a copy of the Diagnostics Checklist found in Appendix A.
- Correcting errors in the system configuration information in the system setup program or the system configuration utility does not resolve a problem.
- The computer's clock/calendar stops.

- The speaker no longer functions. The problem could be a failure of the system timers as well as a failure of the speaker itself. Run the Timers Test, followed by the Speaker Test.
- If a peripheral device appears to malfunction, run the Interrupt Controller Test.
- A spreadsheet program or other type of mathematical application runs abnormally slow, generates error messages concerning calculations or operations, runs incorrectly, or generates incorrect results, or a proven piece of the program appears to malfunction and you confirm that the software itself is not at fault. You can confirm that the software is not at fault by moving the program to another computer and running it there.
- The computer periodically locks up, especially at different places and times in different programs.
- The computer halts in the middle of performing calculations or complex mathematical operations.

Video Test Group

The subtests in the Video Test Group verify the proper operation of the video controller and the video control circuitry installed in the computer. These subtests check for the correct operation of the readable registers in the video circuitry and the controller. They write, read, and verify data patterns in the cursor registers of the controller. The Video Test Group also tests all the video memory and provides additional subtests to test the color features of a color monitor.

NOTE: Most of the subtests are interactive; that is, you must respond before the diagnostics continue to the next subtest.

Subtests

The subtests in the Video Test Group and the video functions they confirm follow:

- Video Memory Test

  Checks the read/write capability of video memory in various video modes.

- Video Hardware Test

  Checks the cursor registers and the horizontal and vertical retrace bit registers in the video controller.

- Text Mode Character Test

  Checks the video subsystem's ability to present data in text modes.

- Text Mode Color Test

  Checks the video subsystem's ability to present color in text modes.

- Text Mode Pages Test

  Checks the video subsystem's ability to map and present all available video pages on the screen, one page at a time.

- Graphics Mode Test

  Checks the video subsystem's ability to present data and color in graphics modes.

- Color Palettes Test

  Checks the video subsystem's ability to display all of the available colors.

- Solid Colors Test

  Checks the video subsystem's ability to show screens full of solid colors. Allows you to check for missing color subpixels.

Many of these tests display characters or graphics on the screen for you to verify. Samples of these screens are shown in Appendix B, "Diagnostic Video Tests."

NOTE: The default limit for testing super video graphics array (SVGA) modes is No. If you are testing an external monitor, change the default to Yes.

Why Run a Video Test?

Many of the symptoms that would prompt you to run a subtest in the Video Test Group are obvious, because the monitor is the visual component of the computer system. Before you run the Video Test Group or any of its subtests, you should make sure that the problem is not in the software or caused by a hardware change. You should also try running all of the software support utilities provided for the monitor and the video subsystem.

If the following symptoms still occur, run the appropriate test(s) as follows:

- If the monitor shows a partially formed or distorted image, run all of the subtests in the Video Test Group.
- If the alignment of text or images is *off*, regardless of the program you are running, run the Text Mode Character Test, Text Mode Pages Test, and Graphics Mode Test.
- If you have a color monitor or a program that runs in color, but the color is intermittent or not displayed at all, run the Text Mode Color Test, Color Palettes Test, and Solid Color Test.
- If the monitor malfunctions in one mode but works fine in another (for example, text is displayed correctly, but graphics are not), run the Text Mode Character Test, Text Mode Color Test, Text Mode Pages Test, and Graphics Mode Test.

Keyboard Test Group

The subtests in the Keyboard Test Group verify the correct operation of the keyboard and the keyboard controller chip.

Subtests

The keyboard subtests and the keyboard functions they confirm follow:

- Controller Test

  Confirms the ability of the keyboard controller chip to communicate with the keyboard and the programming of the controller chip.

- Key Sequence Test

  Verifies that the keys on the keyboard function correctly when you press the keys in a predefined order.

- Interactive Test

  Checks the internal microcode of the keyboard and the external interface of the keyboard controller chip for a malfunctioning key.

- Stuck Key Test

  Checks the internal microcode of the keyboard and the external interface of the keyboard controller chip for a repeating-key signal.

Why Run a Keyboard Test?

Keyboard problems are not always caused by the keyboard. For example, a complete lockup of the computer system, rendering the keyboard inoperable, is more likely caused elsewhere. There are three symptoms that are likely to be keyboard-related. Sometimes, the configuration of a program changes the function of a key or key combination. Likewise, key configuration programs can change a key's function. Because these programs are memory resident, you should be sure to clear them out of the computer's memory before running a subtest in the Keyboard Test Group. Clear them from memory by rebooting the computer from the *Dell Server Assistant* CD. When these possibilities have been eliminated, and if the following symptoms occur, you should run one or more of the subtests in the Keyboard Test Group:

- When you press a key, the character represented by that key appears repeatedly; the key seems to be stuck. Run the Stuck Key Test.
- When you press a key and the response is different from the usual response or the response you anticipated, the key contact may be damaged. Run the Keyboard Interactive Test.
- When a key does not work at all, run all of the subtests in the Keyboard Test Group.

Mouse Test

The Mouse Test checks the functionality of the mouse controller (which coordinates cursor movement on the screen with corresponding movement of the mouse or touch pad) and the operation of the mouse keys/touch pad.

Subtests

There are no subtests for the Mouse Test Group.

Why Run the Mouse Test?

Mouse or touch pad problems are as likely to originate in RAM as they are to be caused by a faulty mouse or touch pad. Three sources of RAM-related problems include the configuration of a program (which changes the function of the mouse or touch pad), memory-resident programs, and failure of a device driver (the software that controls the function of the mouse or touch pad). If these possibilities have been eliminated and the following symptoms persist, run the Mouse Test:

- When you press a mouse button or the touch pad, the function of the button (or touch pad) continues; that is, the button (or touch pad) seems to be stuck.
- If the response when you press a mouse button or the touch pad is different from the usual or anticipated response, the button (or touch pad) contact may be damaged.
- A mouse button or the touch pad does not work at all.
- The cursor does not respond on the screen in accordance with the movements you make with the mouse or touch pad.

Diskette Drives Test Group

The subtests in the Diskette Drives Test Group allow you to test both 5.25-inch and 3.5-inch diskette drives of all capacities.

Subtests

The diskette drive subtests in the Diskette Drives Test Group and the drive functions they confirm follow:

- Change Line Test

  Checks for bent pins on the diskette drive controller and for defective lines on the diskette cable.

- Seek Test

  Checks the drive's ability to search for a specified track on the diskette and to position its read/write heads to all tracks.

- Read Test

  Positions the read/write heads at each cylinder of the diskette for reading data and verifies that all tracks on the diskette can be read correctly.

- Write Test

  Positions the read/write heads at each cylinder of the diskette and verifies that all tracks on the diskette can be written to correctly.

Why Run a Diskette Drives Test?

Often, a diskette drive problem may first appear to be a diskette problem. A box of defective diskettes might produce faulty-drive error messages. The test results can be confusing, so Dell suggests running the subtests in the Diskette Drives Test Group more than once using diskettes from different sources.

Another possible cause of diskette drive problems is human error—typing a command in an incorrect form (usually called a *syntax* error). Be sure you have entered the command in the proper form.

When the diskette(s) and command syntax are eliminated as causes, the following symptoms usually suggest a drive problem and warrant running a subtest in the Diskette Drives Test Group:

- An error message appears on the screen stating that the computer cannot read from or write to a diskette.
- A diskette cannot be properly formatted, or format error messages appear on the screen.
- Data on diskettes is corrupted or lost; these problems may be intermittent.

Serial/Infrared Ports Test Group

The subtests in the Serial/Infrared Ports Test Group check the computer's interface with external devices, such as a printer and a mouse, that are connected to the computer through a serial or infrared port. The subtests in this test group are not intended as a diagnostic test for the actual peripheral attached to each port.

NOTES: With certain modems installed, the subtests in the Serial/Infrared Ports Test Group may fail because the modem appears to the diagnostics as a serial or infrared

port, but it cannot be tested as a serial or infrared port. If a modem is installed and one of the subtests in the Serial/Infrared Ports Test Group fails, remove the modem and run the diagnostic tests again.

If an external loopback connector is not attached to a serial or infrared port, the External Transmission Test will fail for that port and the results of this test should therefore be ignored. An external modem connected to the port does not substitute for an external loopback connector.

Subtests

The subtests in the Serial/Infrared Ports Test Group and the port functions they confirm follow:

- Baud Rate Test

  Checks the baud rate generator in each serial communications chip against the computer's clock.

- Interrupt Test

  Checks the serial port's ability to send IRQs to the microprocessor.

- Internal Transmit Test

  Checks several internal functions of the serial port using the internal loopback mode of the serial communications chip.

- External Transmit Test

  If a loopback device is attached, checks the line control bits of the serial port and sends a test pattern at several baud rates, checking the returned values.

Why Run a Serial/Infrared Ports Test?

If the diagnostics does not recognize the computer's serial or infrared ports, enter the system setup program and check the Serial Port 1 Address and Serial Port 2 Address categories to see whether the port has been disabled. The subtests in the Serial/Infrared Ports Test Group cannot test a port unless it is enabled.

When a port is faulty, it may not be immediately evident that the port, and not the device connected to the port, is faulty. Instead, the peripheral (such as a printer or mouse) might behave erratically or not operate at all. If the external device is not properly installed through the software, it also may not function properly. Try operating the peripheral from different programs or through the operating system. If it still does not work, you can eliminate the software configuration as the cause of the problem.

Another possible cause for errors is the external device. Use the documentation that came with the peripheral to troubleshoot it and confirm that it is working properly. Most printers have a self-test.

After you eliminate incorrect system configuration information settings, peripheral malfunctions, and software errors as potential causes of port problems, you can run the subtests in the Serial/Infrared Ports Test Group to check the hardware. Although the following symptoms can be caused by faulty peripherals or software errors, they might also suggest a port problem:

- If a peripheral works intermittently or produces intermittent errors, the port may be faulty.
- If the computer displays an error message that is related to the external device connected to a port, but corrections to the device do not resolve the error, run the appropriate subtest in the Serial/Infrared Ports Test Group.
- If the software and the diagnostics do not recognize that you have a serial or infrared port, you should check the Serial Port 1 Address and Serial Port 2 Address categories in the system setup program, and if necessary, run the appropriate subtest in the Serial/Infrared Ports Test Group.

Parallel Ports Test Group

The subtests in the Parallel Ports Test Group check the computer's interface with external devices, such as a printer, that are connected to the computer through a parallel port. The subtests in the Parallel Port Test Group are not intended as a diagnostic test for the actual peripheral attached to each port. The only exception is a printer, as described in the Internal Test.

NOTE: If an external loopback connector is not attached to the parallel port, the External Loopback Test will fail for that port and the results of this test should therefore be ignored.

Subtests

The subtests in the Parallel Ports Test Group and the port functions they confirm follow:

- Internal Test

  Checks several internal functions of the parallel port.

- External Loopback Test

  Tests the functionality of the control lines through an external loopback connector, if an external loopback connector is available.

- External Interrupt Test

  Tests the parallel port's ability to generate interrupts from all possible sources, if an external loopback connector or printer is available.

- Printer Pattern Test

  Tests a printer and tests the parallel port's ability to send a pattern to the printer, if connected.

Why Run a Parallel Ports Test?

If the diagnostics does not recognize the computer's parallel port, enter the system setup program and check the Parallel Port ECP-DMA category to see if the port has been disabled. The subtests in the Parallel Ports Test Group cannot test a port unless it is enabled.

When a port is faulty, it may not be immediately evident that the port, and not the device connected to the port, is faulty. Instead, the peripheral (such as a printer) might behave erratically or not operate at all. If the external device is not properly installed through the software, it also may not function properly. Try operating the peripheral from different programs or through the operating system. If it still does not work, you can eliminate the software setup as the cause of the problem.

Another possible cause for errors is the external device. Use the documentation that came with the peripheral to troubleshoot it and confirm that it is working properly. Most printers have a self-test.

After you eliminate incorrect system configuration information settings, peripheral malfunctions, and software errors as potential causes of port problems, you can run the subtests in the Parallel Ports Test Group to check the hardware. Although the following symptoms can be caused by faulty peripherals or software errors, they might also suggest a port problem:

- If a peripheral works intermittently or produces intermittent errors, the port may be faulty.
- If the computer displays an error message that is related to the external device connected to a port, but corrections to the device do not resolve the error, run the appropriate subtest in the Parallel Ports Test Group.
- If the software and the diagnostics do not recognize that you have a parallel port, you should check the Parallel Port ECP-DMA category in the system setup program, and if necessary, run the appropriate subtest in the Parallel Ports Test Group.

SCSI Devices Test Group

The subtests in the SCSI Devices Test Group check the functionality of up to four small computer system interface (SCSI) host adapters and all the SCSI devices attached to them.

NOTES: Before conducting these subtests on CD-ROM drives, insert a CD with audio and data tracks (such as a multimedia CD) into each CD-ROM drive. All of the subtests require a CD with data tracks.

If a CD-ROM drive is empty or if it contains a CD that does not have the required data or audio tracks (depending on the subtest[s] being conducted), the subtest(s) will fail.

Subtests

The subtests in the SCSI Devices Test Group and the drive functions they confirm follow:

- Internal Diag. Test

  Causes the device to run its internal self-test.

- Seek Test

  Checks the device's ability to search for a specified track on the device and to position its read/write heads to all tracks.

- Read Test

  Positions the read/write heads at each block of the device for reading data and verifies that all tracks on the device can be read correctly.

- Write Test

  Positions the read/write heads at each block of the device and verifies that all tracks on the device can be written to correctly.

- Eject Test

  Causes a CD-ROM drive to eject its CD or a SCSI tape drive to eject its tape cartridge.

Why Run a SCSI Devices Test?

If you check the SCSI hard-disk drive to determine the amount of available space, the operating system will probably report problem areas. Problem areas on hard-disk drives are common because most hard-disk drives have a small amount of space that is not usable. The hard-disk drive keeps a record of this space so that the computer will not attempt to use it. Identification of unusable disk space, unless it is an unusually large amount (over five percent of the possible total), should not be regarded as a cause for testing the hard-disk drive.

The following are the most common symptoms that might prompt you to test a SCSI device:

- A SCSI hard-disk drive fails during the boot routine.
- Seek errors are reported by the operating system or application programs.
- An error message appears on the screen stating that the computer cannot read from or write to a SCSI device.
- Data on a SCSI device is corrupted or lost; this problem may be intermittent. Once saved by a program, files cannot be properly recalled.

Chapter 6
Checking the Equipment

This chapter provides troubleshooting procedures for equipment that connects directly to the input/output (I/O) panel of the computer, such as the monitor, keyboard, mouse, or printer. Before performing any of the procedures in this chapter, see "Checking Connections and Switches" in Chapter 2. Then perform the troubleshooting procedures for the equipment that is malfunctioning.

You need the following items to perform the procedures in this chapter:

- The *Dell Server Assistant* CD
- A blank, formatted diskette
- The system documentation

NOTE: When you see the question, "Is the problem resolved?" *in a troubleshooting procedure, perform the operation that caused the problem.*

Troubleshooting the Monitor

Troubleshooting video problems involves determining which of the following is the source of the problem:

- Monitor and monitor interface cable
- Video memory
- Video logic of the computer or a video expansion card

If information on the monitor screen is displayed incorrectly or not at all, complete the following steps to determine the problem:

1. **Turn on the system, including any attached peripherals.**
2. **Adjust the switches and controls as specified in the monitor's documentation to correct the video image, including the horizontal and vertical position and size.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Continue to step 3.
3. **Run the system diagnostics software.**

   See Chapter 5, "Running the System Diagnostics." Does the monitor display text properly?

   Yes. Go to step 5.

   No. Continue to step 4.
4. **Type** g **and press the down-arrow key four times. Then press the plus (+) key to send all *error* messages to a printer. To send the error messages to a file named** results **on a diskette, insert a blank diskette into drive A, and then press the plus (+) key twice to send the error messages to the file.**
5. **Run the Video Test Group in the system diagnostics.**

   See Chapter 5, "Running the System Diagnostics." Most of the tests in the Video Test Group require you to respond before the diagnostics continues with the next test.

   Do the tests complete successfully?

   Yes. You have fixed the problem.

   No. Continue to step 6.
6. **Turn off the system and disconnect it from alternating current (AC) power. Swap the monitor with one of the same type that is working, and reconnect the system to AC power.**

7. **Run the Video Test Group in the system diagnostics again.**

   Do the tests complete successfully?

   Yes. The monitor must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. If a video expansion card is installed in the computer, see "Troubleshooting Expansion Cards" in Chapter 7. If no video expansion card is installed, the built-in video controller is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the Keyboard

This procedure determines what kind of keyboard problem you have. If a system error message indicates a keyboard problem when you start up the computer system or while the system diagnostics is running, complete the following steps:

1. **Look at the keyboard and the keyboard cable for any signs of damage. Press and release each key on the keyboard.**

   Do the keyboard and its cable appear to be free of physical damage, and do the keys work?

   Yes. Go to step 3.

   No. Continue to step 2.

2. **Swap the faulty keyboard with a working keyboard.**

   To swap a faulty keyboard, unplug the keyboard cable from the computer's back panel and plug in a working keyboard.

   Is the problem resolved?

   Yes. The keyboard must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Continue to step 3.

3. **Run the Keyboard Test Group in the system diagnostics.**

   See Chapter 5, "Running the System Diagnostics."

   Can you use the keyboard to select the Keyboard Test Group?

   Yes. Continue to step 4.

   No. Go to step 5.

4. **Does the Keyboard Interactive Test complete successfully?**

   Yes. Go to step 6.

   No. Continue to step 5.

5. **Swap the faulty keyboard with a working keyboard.**

6. **Does the Keyboard Controller Test complete successfully?**

   Yes. The keyboard must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. The keyboard controller on the system board is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting I/O Ports

This section provides a procedure for troubleshooting the ports on the computer's I/O panel and the equipment connected to them, such as a printer, scanner, or other peripheral device.

You can also use this procedure to test I/O ports on expansion cards. However, you should first complete the procedures in "Troubleshooting Expansion Cards" in Chapter 7 to verify that the card is configured and installed correctly.

If a system error message indicates a port problem or if equipment connected to a port seems to perform incorrectly or not at all, the source of the problem may be any of the following:

- A faulty connection between the I/O port and the peripheral device

- A faulty cable between the I/O port and the peripheral device
- A faulty peripheral device
- Incorrect settings in the system setup program
- Incorrect settings in the system's configuration files
- Faulty I/O port logic on the system board

NOTE: With certain modems installed, subtests in the Serial/Infrared Ports Test Group may fail because the modem appears to the diagnostics as a serial port, but it cannot be tested as a serial port. If you have a modem installed and you experience a serial-port test failure, remove the modem and run the diagnostic tests again.

Troubleshooting the Basic I/O Functions

This procedure determines whether the computer's basic I/O functions are operational. If a system error message indicates an I/O port problem or the device connected to the port does not function properly, follow these steps:

1. **Enter the system setup program, and check the settings for the Configuration Mode and Mouse categories.**

   Is the Configuration Mode category set to Auto, and is the Mouse category set to Installed?

   Yes. Go to step 3.

   No. Continue to step 2.

2. **Change the setting for the Configuration Mode category to Auto, and change the setting for the Mouse category to Installed; then reboot the system.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Continue to step 3.

3. **Check the contents of the start-up files.**

   See "Installing and Configuring Software" in Chapter 4.

   Are the port configuration commands correct?

   Yes. Go to step 5.

   No. Continue to step 4.

4. **Change the necessary statements in the start-up files.**

   If the port problem is confined to a particular application program, see the application program's documentation for specific port configuration requirements.

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Continue to step 5.

5. **Reboot the system from the *Dell Server Assistant* CD, and run the Serial/Infrared Ports Test Group and/or the Parallel Port Test Group in the system diagnostics.**

   See Chapter 5, "Running the System Diagnostics."

   The Serial/Infrared Ports Test Group and the Parallel Ports Test Group test the basic functions of the system board's I/O port logic. Also, if a parallel printer is connected to the parallel port, the Parallel Ports Test Group tests the communications link between the system board's I/O port logic and the printer.

   Do the tests complete successfully?

   Yes. Continue to step 6.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

6. **If the problem persists, go to "Troubleshooting a Parallel Printer" or "Troubleshooting a Serial I/O Device" later in this section, depending on which device appears to be malfunctioning.**

Troubleshooting a Parallel Printer

If the procedure in the preceding subsection, "Troubleshooting the Basic I/O Functions," indicates that the problem is with a parallel printer, follow these steps:

1. **Turn off the parallel printer and computer.**
2. **Swap the parallel-printer interface cable with a known working cable.**
3. **Turn on the parallel printer and computer.**
4. **Attempt a print operation on the parallel printer.**

   Does the print operation complete successfully?

   Yes. The interface cable must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Continue to step 5.
5. **Run the parallel printer's self-test.**

   See the documentation that came with your printer for information on the self-test.

   Does the self-test complete successfully?

   Yes. Continue to step 6.

   No. The printer is probably defective. If the printer was purchased from Dell, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
6. **Attempt another print operation on the parallel printer.**

   Does the print operation complete successfully?

   Yes. You have fixed the problem.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting a Serial I/O Device

If the procedure in the preceding subsection, "Troubleshooting the Basic I/O Functions," indicates that the problem is with a device connected to one of the serial ports, follow these steps:

1. **Turn off the computer and any peripheral devices connected to the serial ports.**

   Are two serial devices connected to the computer?

   Yes. Continue to step 2.

   No. Go to step 4.
2. **Disconnect the devices from serial ports 1 and 2, and connect the malfunctioning serial device to the opposite port.**
3. **Turn on the computer and the reconnected serial device.**

   Is the problem resolved?

   Yes. The serial port may be defective. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Continue to step 4.
4. **Turn off the computer and the serial device, and swap the interface cable (that connects the device to the serial port) with a known working cable.**
5. **Turn on the computer and the serial device.**

   Is the problem resolved?

   Yes. The interface cable must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Continue to step 6.
6. **Turn off the computer and the serial device, and swap the device with a comparable working device.**

   For example, if the serial mouse has a problem, swap it with a serial mouse that you know is working properly.
7. **Turn on the computer and the serial device.**

   Is the problem resolved?

   Yes. The serial device must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Chapter 7
Checking Inside the Computer

This chapter provides troubleshooting procedures for components inside the computer. Before you start any of the procedures in this chapter, do the following:

- Perform the procedures described in "Checking Connections and Switches" and "The System Setup Program" in Chapter 2.
- Read the safety instructions in "Safety First—For You and the Computer" next in this chapter.

You need the following items to perform the procedures in this chapter:

- The *Dell Server Assistant* CD
- The system documentation
- A #2 Phillips-head screwdriver (or 1/4-inch hex-nut driver)
- The key to the system keylocks

NOTE: When you see the question, "Is the problem resolved?" *in a troubleshooting procedure, perform the operation that caused the problem.*

Safety First—For You and the Computer

WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer.

The procedures in this chapter require that a trained service technician remove the covers and work inside the computer. While working inside the computer, do not attempt to service the computer except as explained in this guide and elsewhere in Dell documentation. Always follow the instructions closely.

WARNING: Before a trained service technician accesses the inside of the computer, any and all power supplies must be disconnected from their power source, and the cables to the power supplies must also be disconnected. If this computer has more than one power supply, disconnect both power supply cords before servicing to avoid electrical shock.

Working inside the computer is safe—if you observe the following precautions.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before starting to work on the computer, perform the following steps in the sequence indicated:

1. ***Turn off*** **the computer and all peripherals.**
2. ***Disconnect*** **the computer, peripherals, and power supplies from their power sources. Also disconnect any telephone or telecommunication lines from the computer. Doing so reduces the potential for personal injury or shock.**
3. ***Touch*** **an unpainted metal surface on the computer chassis, such as the power supply, before touching anything inside the computer.**

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

In addition, Dell recommends that you periodically review the safety instructions at the front of this guide.

Removing and Replacing the Computer Covers

To troubleshoot problems inside the computer, you need to remove one or both of the computer covers.

WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer.

WARNING: Due to high voltages and energy hazards, *never* operate the system without the covers installed.

Removing the Computer Covers

Use the following procedure to remove a computer cover:

1. **Observe the *Warning for Your Personal Safety and Protection of the Equipment* described earlier in this chapter. Also observe the safety instructions at the front of this guide.**
2. **To remove a computer cover, turn the cover's keylock on the back panel of the computer (see Figure 7-1) to the unlocked position.**

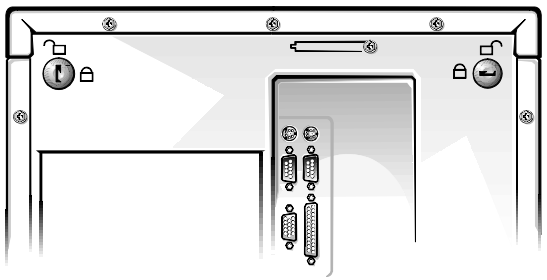


Figure 7-1. Keylocks on the Computer's Back Panel

3. **Loosen the three screws along the back edge of the cover (see Figure 7-2).**
4. **Slide the cover toward the rear of the system an inch or so, grasp the top of the cover at both ends, and lift it straight away from the chassis.**

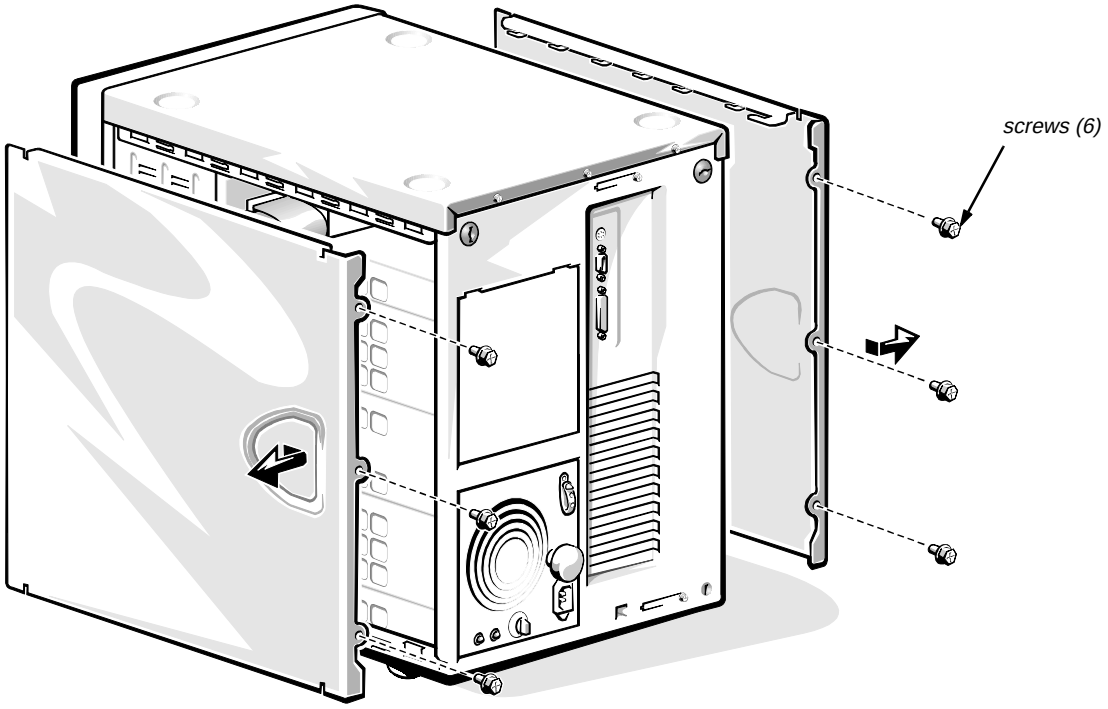


Figure 7-2. Removing the Computer Covers

Replacing the Computer Covers

Use the following procedure to replace a computer cover:

1. **Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not catch on the computer cover.**

   CAUTION: Make sure that there are no cables or cable connectors lying on the top diskette drive in the upper drive cage. Foreign objects on top of the drive can interfere with drive operation and permanently damage the drive.

2. **Check that no tools or extra parts (including screws) are left inside the computer.**
3. **Make sure the applicable keylock is in the unlocked position.**
4. **Fit the cover over the side rail at the bottom of the chassis, and slide it closed.**
5. **Secure the cover with the three screws.**
6. **Set the keylock to the locked position.**

Removing the Front Bezel

Use the following procedure to remove the front bezel:

1. **Remove the computer covers.**

   See the previous subsection, "Removing the Computer Covers."

2. **Release the two tabs on each side of the bezel (see Figure 7-3).**

3. **Slide the front bezel straight away from the chassis.**

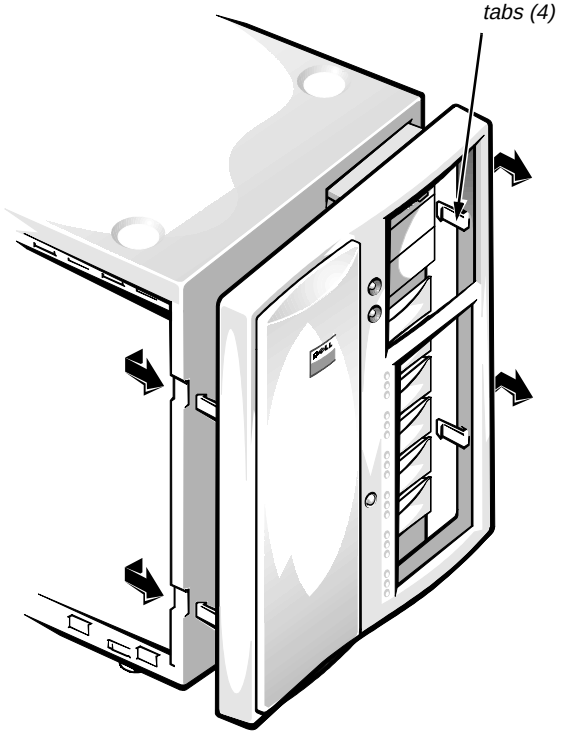


Figure 7-3. Removing the Front Bezel

Inside the Chassis

In Figures 7-4 and 7-5, the computer cover is removed to provide interior views from the left and right sides. These illustrations also identify features on the front and back of the computer. Refer to them to locate interior features and components discussed later in this guide.

When you look inside the computer, note the *direct current (DC) power cables* leading from the power-supply paralleling board. These cables supply power to the system board, small computer system interface (SCSI) backplane board, externally accessible drives, and certain expansion cards that connect to external peripherals.

The flat ribbon cables are the *interface cables* for internal drives. For SCSI devices, the interface cable connects externally accessible SCSI devices and the SCSI backplane board to a SCSI host adapter either on the system board or on an expansion card.

The *system board*—the large, vertical printed circuit board at the left side of the chassis near the back—holds the computer's control circuitry and other electronic components. Some hardware options are installed directly onto the system board. The system board provides *10 expansion-card connectors*. The *external drive bays* provide space for up to four half-height drives, typically diskette drives, CD-ROM drives, or tape drives. The internal drive bays provide space for up to six half-height SCSI hard-disk drives. These drives are connected to the SCSI host adapter via the *SCSI backplane board*, which manages the drive bays and monitors the drive environment, including voltages and temperatures.

During an installation or troubleshooting procedure, you may be required to change a *jumper* or *switch* setting on the system board, the microprocessor module, an expansion card, or a drive. For more information on the jumpers and switches, see Appendix C, "Jumpers, Switches, and Connectors."

WARNING: Before a trained service technician accesses the inside of the computer, any and all power supplies must be disconnected from their power source, and the cables to the power supplies must also be disconnected. If this computer has more than one power supply, disconnect both power supply cords before servicing to avoid electrical shock.

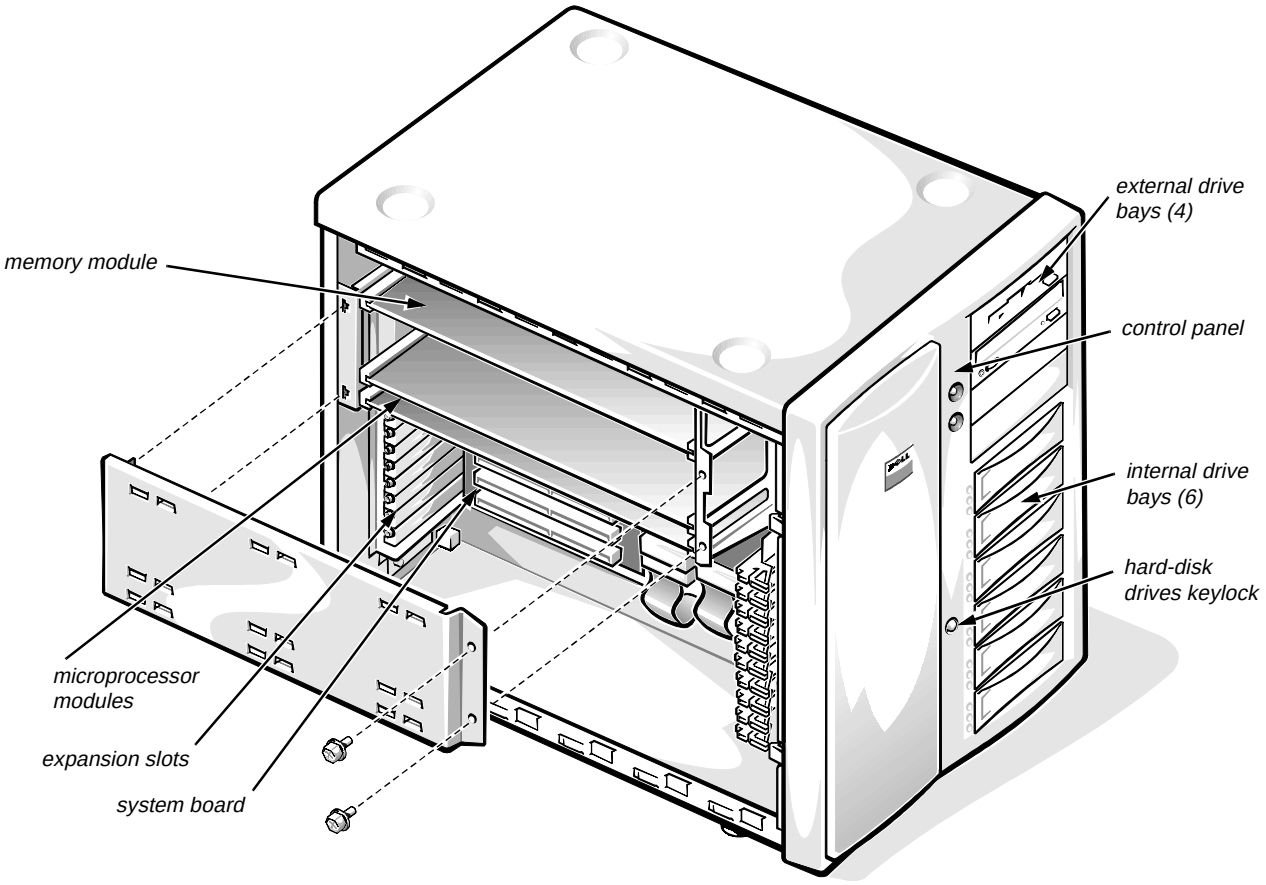


Figure 7-4. Inside the Chassis—Front/Left Side View

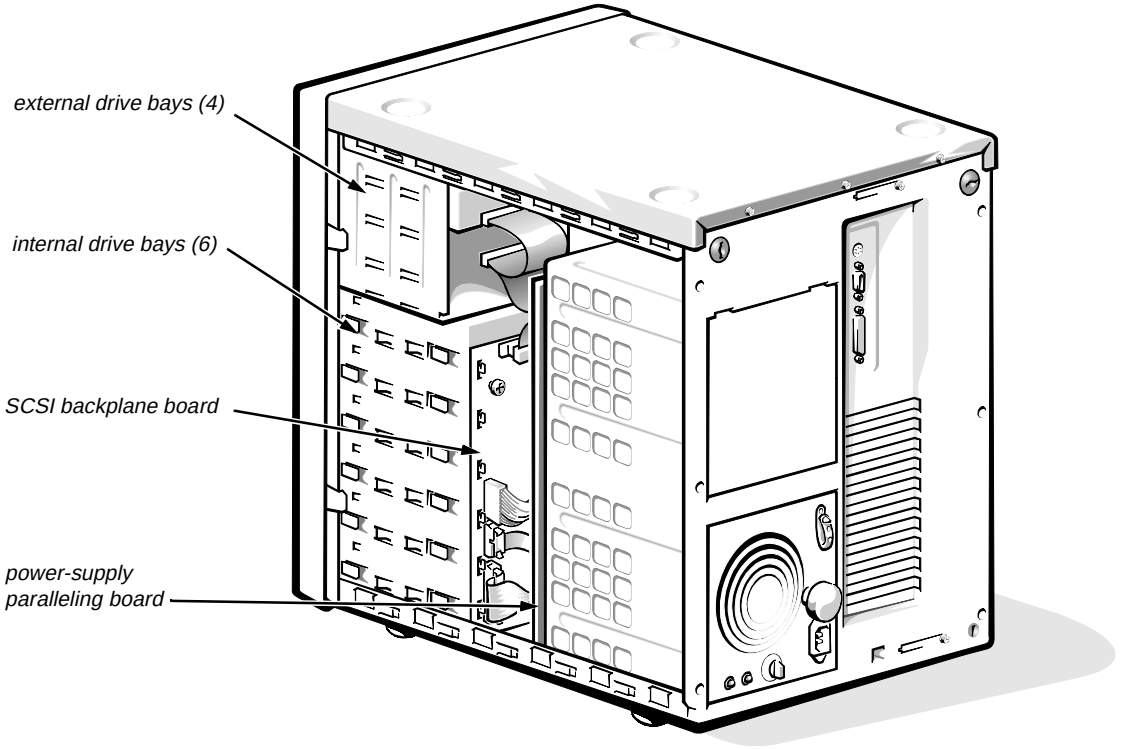


Figure 7-5. Inside the Chassis—Back/Right Side View

Responding to a Dell HIP Alert Message

The Dell Hardware Instrumentation Package (HIP) server-management application program monitors critical system voltages and temperatures, the system cooling fans, and the status of the SCSI hard-disk drives in the computer. The program generates alert messages that appear in the simple network management protocol (SNMP) trap log file. More information about the Alert Log window and options and various messages is provided in the Dell HIP online help and the Dell HIP *User's Guide*.

Troubleshooting a Wet Computer

Liquid spills, splashes, and excessive humidity can cause damage to the system. If an external device (such as a printer or an external drive) gets wet, contact the manufacturer for instructions. If the computer gets wet, complete the following steps:

1. **Turn off the system, including any attached peripherals, and disconnect all the alternating current (AC) power cables from their power sources.**

2. **Remove the computer covers.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Let the computer dry for at least 24 hours.**

   Make sure that it is thoroughly dry before proceeding.

4. **Remove all expansion cards, the microprocessor module(s), and the memory module installed in the computer.**

   See "Removing an Expansion Card" in Chapter 8.

5. **Replace the computer covers, reconnect the system to AC power, and turn it on.**

   Does the system have power?

   Yes. Continue to step 6.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

6. **Turn off the system, disconnect it from AC power, remove the left computer cover, and reinstall the items you removed in step 4.**

7. **Replace the computer cover, and reconnect the system to AC power.**

8. **Run the System Set Test Group in the system diagnostics.**

   See Chapter 5, "Running the System Diagnostics."

   Do the tests complete successfully?

   Yes. The system is operating properly.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting a Damaged Computer

If the computer was dropped or damaged, you should check the computer to see if it functions properly. If an external device attached to the computer is dropped or damaged, contact the manufacturer of the device for instructions or see Chapter 11, "Getting Help," for information on obtaining technical assistance from Dell. Follow these steps to troubleshoot a damaged computer:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

2. **Remove the left computer cover.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Check all the board and card connections in the computer.**

   Check the following connections:

   - Expansion-card connections to the system board
   - Drive carrier connections to the SCSI backplane board
   - Microprocessor module(s) connections to the system board
   - Memory module connection to the system board

4. **Verify all internal cable and component connections.**

   Make sure that all cables are properly connected and that all components are properly seated in their connectors and sockets.

5. **Replace the left computer cover and reconnect the system to AC power.**

6. **Run the System Set Test Group in the system diagnostics.**

   See Chapter 5, "Running the System Diagnostics."

   Do the tests complete successfully?

   Yes. The system is operating properly.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the RTC Chip

If an error message indicates a problem with the real-time clock (RTC) chip or if the system setup program loses the system configuration information when the computer is turned off, the RTC chip may be defective.

Follow these steps to troubleshoot the RTC chip:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**
2. **Remove the left computer cover.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Check the connection of the RTC chip to the system board.**

   Is the RTC chip firmly installed in the socket on the system board?

   Yes. Go to step 5.

   No. Continue to step 4.

4. **Reseat the RTC chip in its socket.**

   Is the problem resolved?

   Yes. The RTC chip was loose. You have fixed the problem.

   No. Continue to step 5.

5. **Replace the RTC chip.**

   See "Replacing the RTC Chip" in Chapter 8 for instructions on replacing the RTC chip.

   Is the problem resolved?

   Yes. The RTC chip's charge was low. You have fixed the problem.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting and Replacing the Battery on the Control Panel

The battery on the control panel stores the power state of the system. For example, if a power failure occurs while the system is running, the system will remain on when power is restored. However, if the system does not keep its power state during a power interruption, you should replace the battery. Follow these steps to replace the battery on the control panel:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**
2. **Remove the left and right computer covers.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Remove the front bezel.**

   See "Removing the Front Bezel" earlier in this chapter.

4. **Remove the battery.**

   The battery is located just above the center of the control panel.

   Pry the battery out of its socket with your fingers or a blunt, nonconductive object, such as a plastic screwdriver.

5. **Install the new battery with the "+" side facing up (see Figure 7-6).**

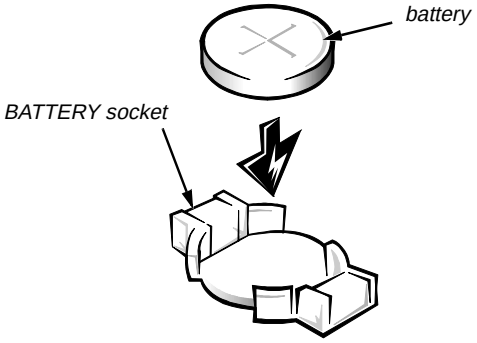


Figure 7-6. Battery Replacement

6. **Replace the front bezel, the left and right computer covers, reconnect the computer and peripherals to their power sources, and turn them on.**

   Is the problem resolved?

   Yes. The battery was defective. You have fixed the problem.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting Power Supply Problems

The optional redundant power supplies in Dell PowerEdge 6100 systems are controlled by the power-supply paralleling board. The two light-emitting diodes (LEDs) on the back of the power supply (see Figure 7-7) signal the status of the power supply. If the red power-supply fault indicator lights up, the power supply should be replaced.

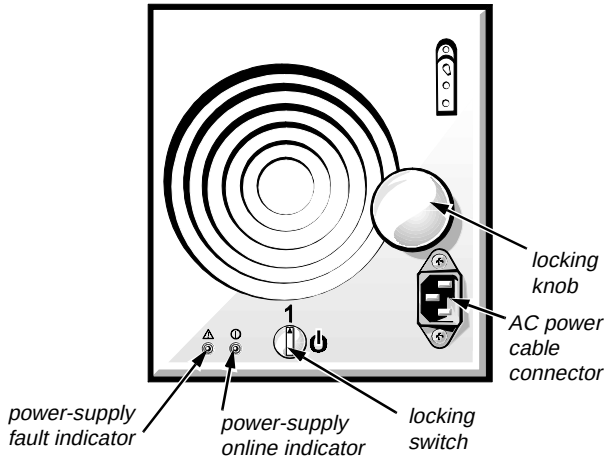


Figure 7-7. Power Supply Features

Replacing a Power Supply

Follow these steps to replace a power supply.

CAUTION: If a power supply in this computer system fails, do not remove it from the system. The failed power supply must remain in the system until it can be replaced with a working power supply. Failure to do so will cause the hard-disk drives to overheat.

1. **Disconnect the AC power cable from the power outlet; then disconnect the other end of the cable from the power supply.**

   Open the plastic strain-relief clip and remove the AC power cable.

2. **Turn the locking switch on the power supply to the "standby" position, marked by a partial circle with a line through the top.**
3. **Turn the locking knob counterclockwise to release the power supply.**
4. **Slide the power supply out of the chassis (see Figure 7-8).**

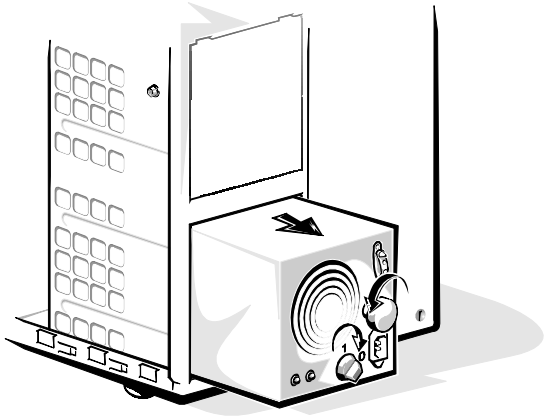


Figure 7-8. Removing the Power Supply

5. **Check that the locking switch on the new power supply is set to the "standby" position, then slide the power supply into the chassis.**
6. **Turn the locking knob clockwise until the replacement power supply is secured in the chassis.**
7. **Connect the AC power cable to the power supply and to the power outlet.**

   Make sure that the AC power cable passes through the plastic strain-relief clip.
8. **Turn the locking switch on the power supply to the "on" position, marked by an "1."**

   The green online indicator on the power supply should light up.

Troubleshooting Power Cable Connections

1. **Check the AC power outlet and power cable (see "Checking Connections and Switches" in Chapter 2).**
2. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**
3. **Remove the computer covers.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.
4. **Check the cable connections listed in Table 7-1.**

Table 7-1. Power Cable Connectors on the Power-Supply Paralleling Board

Connector	Cable Connection
PWR1	To PS3 connector on system board
PWR2	To PS1 or PS2 connector on system board
PWR3	To PS1 or PS2 connector on system board
PWRFD	To diskette drives and other devices in external drive bays
PWRSCSI	To POWER connector on SCSI backplane board

Troubleshooting a Cooling Fan

Three cooling fans are installed in the Dell PowerEdge 6100 system. If you observe that any of the three redundant cooling fans is not operating, or the Dell HIP server-management application program issues a fan-related error message, replace the fan as described in the following subsection.

Replacing a Cooling Fan

Follow these steps to replace a defective cooling fan.

WARNING: Only trained service technicians should perform this procedure. Do not remove the left computer cover with the power on unless you are replacing a cooling fan. (*Never* remove the right computer cover with the computer power on. There are high voltages in this area that can cause bodily harm.)

Do not touch or attempt to service any components other than the cooling fan. Other components could be damaged if you attempt to service them with the computer power on.

CAUTION: To ensure correct installation and safety, use cooling fans supplied by Dell.

1. **Remove the left computer cover.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. **Identify the defective cooling fan.**
3. **Disconnect the cooling fan's power cable from the applicable FAN connector on the system board.**
4. **Depress the catch on the fan carrier (see Figure 7-9) and remove the fan carrier from the chassis.**

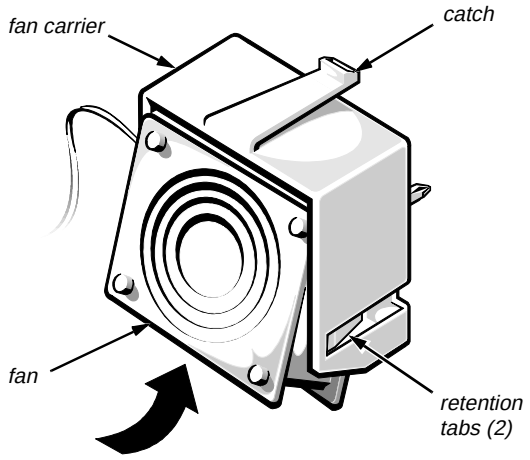


Figure 7-9. Replacing a Cooling Fan

5. **Remove the cooling fan from the fan carrier by releasing the two fan retention tabs inside the carrier (see Figure 7-9).**
6. **Insert the replacement cooling fan in the carrier, and snap the two fan retention tabs back into position.**

   Orient the fan so that the power cable is at the upper-right corner of the carrier.

7. **Reinstall the fan carrier in the computer.**

   Insert the two tabs along the lower edge of the fan carrier into the lances in the chassis; then raise the fan carrier into position until the catch on the fan carrier snaps into place in the computer chassis.

8. **Connect the cooling-fan power cable to the appropriate FAN connector on the system board.**

   The fan should begin running.

9. **Replace the left computer cover.**

Troubleshooting Expansion Cards

If an error message indicates an expansion-card problem or if an expansion card seems to perform incorrectly or not at all, the problem could be a faulty connection, a conflict with software or other hardware, or a faulty expansion card. Follow these steps to troubleshoot expansion cards:

1. **Start the system configuration utility, and verify that all Extended Industry-Standard Architecture (EISA) and Industry-Standard Architecture (ISA) expansion cards have been configured correctly. Save the configuration before exiting the utility.**

   See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for instructions.

2. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

3. **Remove the left computer cover.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

4. **Verify that each expansion card is firmly seated in its connector.**

   Are the expansion cards properly seated in their connectors?

   Yes. Go to step 6.

   No. Continue to step 5.

5. **Reseat the expansion cards in their connectors.**

   See "Relocating or Removing an Expansion Card" and "Installing an Expansion Card" in Chapter 8 for instructions on removing and replacing expansion cards.

   Is the problem resolved?

   Yes. The connection was loose. You have fixed the problem.

   No. Continue to step 6.

6. **Verify that the appropriate cables are firmly connected to their corresponding connectors on the expansion cards.**

   For instructions on which cables should be attached to specific connectors on an expansion card, see the expansion card's documentation.

   Are the appropriate cables firmly attached to their connectors?

   Yes. Go to step 8.

   No. Continue to step 7.

7. **Reconnect the cable connectors to the appropriate connectors on the expansion cards.**

   Is the problem resolved?

   Yes. The cable connections were loose. You have fixed the problem.

   No. Continue to step 8.

8. **Inspect all jumpers and configuration switches on each expansion card.**

   Most ISA expansion cards have configuration settings for an interrupt request (IRQ) line, a direct memory access (DMA) channel, and a base-memory or basic input/output system (BIOS) address. To keep expansion cards from conflicting with each other, you need to know both the starting memory address and the amount of memory required by each card. For instructions on jumpers and configuration settings, see the expansion card's documentation.

   Is each expansion card configured correctly?

   Yes. Go to step 10.

   No. Continue to step 9.

9. **Reconfigure the card according to the instructions in the card's documentation.**

   Is the problem resolved?

   Yes. The memory configuration of the card was incorrect. You have fixed the problem.

   No. Continue to step 10.

10. **Inspect all configuration jumpers on the system board to ensure that they are configured correctly for any installed expansion cards.**

    For information on the configuration jumpers and their settings, see Appendix C, "Jumpers, Switches, and Connectors."

    Are the system board's configuration jumpers set correctly?

    Yes. Go to step 12.

    No. Continue to step 11.

11. **Correct the system board's configuration jumper settings.**

    Is the problem resolved?

    Yes. You have fixed the problem.

    No. Continue to step 12.

12. **Remove all expansion cards except the hard-disk drive controller card (if one is installed).**

    See "Removing an Expansion Card" in Chapter 8 for information on removing expansion cards.

13. **Replace the left computer cover, reconnect the system to AC power, and turn it on.**

14. **Enter the system setup program and update the system configuration information.**

    See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for instructions.

    For any EISA and ISA expansion cards, enter the system configuration utility, and update the configuration information.

    See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for instructions.

15. **Run the RAM Test Group in the system diagnostics.**

    See Chapter 5, "Running the System Diagnostics."

    Do the tests complete successfully?

    Yes. Continue to step 16.

    No. See Chapter 11, "Getting Help," for information on obtaining technical assistance.

16. **Turn off the system, disconnect it from AC power, and remove the left computer cover.**

17. **Reinstall one of the expansion cards you removed in step 12, and repeat steps 13 though 15. Then, continue to step 18.**

18. **Repeat steps 16 and 17 for each of the remaining expansion cards that you removed in step 12.**

    Have you reinstalled all of the expansion cards without encountering a test failure?

    Yes. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for information on obtaining technical assistance.

Troubleshooting System Memory

A system memory problem can be a faulty single in-line memory module (SIMM) or a faulty system board. If a random-access memory (RAM) error message appears, the system probably has a memory problem.

When you turn on or reboot the system, the Caps Lock and Scroll Lock indicators on the keyboard should flash momentarily and then turn off. If the Num Lock category in the system setup program is set to On, the Num Lock indicator should flash momentarily and then remain on; otherwise, it should turn off. Abnormal operation of these indicators can result from a defective SIMM. Follow these steps to troubleshoot system memory:

1. **Turn on the system, including any attached peripherals.**

    Does an error message appear indicating invalid system configuration information after the memory count completes?

    Yes. Continue to step 2.

    No. Go to step 12.

2. **Enter the system configuration utility to check the Extended Memory category and add 1024 kilobytes (KB) to the total shown.**

    See Chapter 5, "Using the System Configuration Utility," in the *User's Guide* for instructions.

    Does the amount of memory installed match the Extended Memory setting plus 1024 KB?

    Yes. Go to step 12.

    No. Continue to step 3.

3. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

4. **Remove the left computer cover.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

5. **Remove the support panel.**

   Remove the two screws from the support panel and pull the back edge tabs on the panel out of the slots in the chassis.

6. **Remove the memory module.**

   Hold the module by the corners where the handles are and carefully pull the module out until the edge connectors are free from the system board connector.

   NOTE: Be careful not to touch components or gold edge connectors on the module.

7. **Reseat the SIMMs in their sockets.**

   See "Adding Memory" in Chapter 8 for instructions on removing and replacing SIMMs.

8. **Replace the memory module.**

   Hold the module by the corners with the SIMM sockets facing down. Ease the module into the correct slot guides until it is touching the system board connector. Press the module carefully but firmly into the system board connector and rotate the handles closed.

9. **Replace the support panel.**

   Align the panel so that the two tabs are to the left. Fit the tabs into the two slots on the chassis back and swing the panel closed. Replace the two screws removed in step 5.

   NOTE: Be sure the microprocessor module(s) and memory module fit between the tabs and cover.

10. **Replace the computer cover, reconnect the system to AC power, and turn it on.**

11. **Enter the system configuration utility and check the Extended Memory category and add 1024 KB to the total shown.**

    Does the amount of memory installed match the Extended Memory setting plus 1024 KB?

    Yes. Continue to step 12.

    No. Go to step 13.

12. **Reboot the system, and observe the monitor screen and the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard.**

    Does the monitor screen remain blank, and do the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard remain on?

    Yes. Continue to step 13.

    No. Go to step 15.

13. **Turn off the system, disconnect it from AC power, and remove the left computer cover.**

14. **If possible, swap each SIMM (starting with socket J1) with one of the same capacity, reboot the system, and observe the monitor screen and the indicators on the keyboard.**

    Is the problem resolved?

    Yes. You have fixed the problem.

    No. Continue to step 15.

15. **Run the RAM Test Group in the system diagnostics.**

    See Chapter 5, "Running the System Diagnostics."

    Do the tests complete successfully?

    Yes. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the Video Subsystem

Troubleshooting video problems involves determining which of the following is the source of the problem: the monitor, the monitor interface cable, the video memory, or the video logic of the computer. You can also have a

high-resolution video expansion card installed, which overrides the video logic of the computer.

The following procedure troubleshoots problems with the video memory and video logic only. Before you begin, perform the procedure found in "Troubleshooting the Monitor" in Chapter 6 to determine whether the monitor is the source of the problem.

If you have a high-resolution video expansion card, first complete the steps in "Troubleshooting Expansion Cards" earlier in this chapter to verify that the card is configured and installed correctly.

Follow these steps to troubleshoot the video subsystem:

1. **Run the Video Test Group in the system diagnostics.**

   See Chapter 5, "Running the System Diagnostics."

   Most of the tests in the Video Test Group are interactive; that is, you must respond before the diagnostics continues with the next test.

   Do the tests complete successfully?

   Yes. It is not a video hardware problem. Go to Chapter 4, "Finding Software Solutions."

   No. Continue to step 2.

2. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

3. **Remove the left computer cover.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

4. **Determine whether a video expansion card is installed.**

   Is a video expansion card installed?

   Yes. Continue to step 5.

   No. The built-in video controller is faulty. Go to step 6.

5. **Remove the video expansion card, and repeat step 1.**

   Do the tests complete successfully?

   Yes. The video expansion card is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Continue to step 6.

6. **See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.**

Troubleshooting the System Board

A system board problem can result from a defective system board component, a faulty power supply, or a defective component connected to the system board. If an error message indicates a system board problem, follow these steps to find the problem:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

2. **Remove the left computer cover.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Remove all expansion cards except the hard-disk drive controller card and the video expansion card (if they are installed).**

4. **Replace the left computer cover, reconnect the system to AC power, and turn it on.**

5. **For any EISA and ISA expansion cards, start the system configuration utility, and update the configuration information.**

   See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for instructions.

6. **Run the System Set Test Group in the system diagnostics.**

   See Chapter 5, "Running the System Diagnostics."

   Do the tests complete successfully?

   Yes. Continue to step 7.

   No. Go to step 12.

7. **Turn off the system, disconnect it from AC power, and remove the computer cover.**

8. **Reinstall one of the expansion cards you removed in step 3, repeat steps 4 and 5, and continue with step 9.**

9. **Replace the computer cover, and reconnect the system to AC power.**

10. **Run the System Set Test Group again.**

    Do the tests complete successfully?

    Yes. Continue to step 11.

    No. Go to step 12.

11. **Repeat steps 7, 8, 9, and 10 for each of the remaining expansion cards you removed in step 3.**

    Have you reinstalled all of the expansion cards without encountering a test failure?

    Yes. Continue to step 12.

    No. The expansion card is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

12. **Disconnect the keyboard and reboot the system.**

    NOTE: You may receive a keyboard error message because the keyboard is not connected.

    Does the system boot successfully?

    Yes. Continue to step 13.

    No. Go to step 14.

13. **Swap the keyboard with a comparable working keyboard, and run the System Set Test Group again.**

    Do the tests complete successfully?

    Yes. You have fixed the problem.

    No. Continue to step 14.

14. **See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.**

Troubleshooting the Diskette Drive Subsystem

If the monitor displays a system error message indicating a diskette drive problem during execution of either the boot routine or the system diagnostics, the problem may be caused by any of the following conditions:

- The system configuration settings do not match the physical diskette subsystem configuration.
- The diskette drive cables are not properly connected or are faulty.
- An expansion card is interfering with proper drive operations.
- A diskette drive may be improperly configured.
- The diskette drive or tape drive is faulty.
- The computer's power supply is not providing sufficient power for the drives.
- The computer's diskette drive logic is faulty.

The troubleshooting procedures for the diskette drive subsystem are divided into the following subsections:

- "Checking the Diskette Drive Subsystem"
- "Troubleshooting the Diskette Drive Subsystem"
- "Troubleshooting a SCSI Tape Drive"

Before you begin the troubleshooting procedures, complete steps 1 and 2 in the next subsection, "Checking the Diskette Drive Subsystem," to verify that the system configuration information is correct for the installed diskette drive(s).

If, after completing these steps, the system boots correctly and the monitor no longer displays a system error message, the problem is resolved. If you continue to have problems, however, proceed with the appropriate diskette drive subsystem troubleshooting procedure.

Checking the Diskette Drive Subsystem

To verify that the diskette drive subsystem is operating properly, follow these steps:

1. **Enter the system setup program, and verify that the system is configured correctly in the Floppy Options submenu.**

   See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for instructions.

2. **If the system configuration settings are incorrect, make the necessary corrections in the system setup program, and then reboot the system.**

3. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

   See Chapter 5, "Running the System Diagnostics," for more information.

   Do the tests complete successfully?

   Yes. Continue with the next step in the procedure you were performing.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the Diskette Drive Subsystem

Follow these steps to troubleshoot the diskette drive subsystem:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

2. **Remove both computer covers.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Check the diskette drive cabling.**

   Is the diskette drive securely connected to the proper diskette drive interface cable connector? Is the diskette drive interface cable connector securely connected to the interface connector (labeled "FLOPPY") on the system board? Is the drive's DC power cable firmly connected to the drive?

   Yes. Go to step 5.

   No. Continue to step 4.

4. **Reconnect the cable connectors.**

5. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

6. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

   See Chapter 5, "Running the System Diagnostics," for more information.

   Do the tests complete successfully?

   Yes. You have fixed the problem.

   No. Continue to step 7.

7. **Repeat steps 1 and 2, and remove all expansion cards.**

   See "Expansion Cards" in Chapter 8 for instructions.

8. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

9. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

   Do the tests complete successfully?

   Yes. An expansion card may be conflicting with the diskette drive logic, or you may have a faulty expansion card. Go to "Checking the Diskette Drive Subsystem" earlier in this section.

   No. Continue to step 10.

10. **Repeat steps 1 and 2, and reinstall one of the expansion cards you removed in step 7.**

    See "Installing an Expansion Card" in Chapter 8 for instructions.

11. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

12. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

    Do the tests complete successfully?

    Yes. Continue to step 13.

    No. Go to step 14.

13. **Repeat steps 10 through 12 until all expansion cards have been reinstalled or until one of the expansion cards prevents the system from booting from the *Dell Server Assistant* CD. Then continue to step 14.**

14. **Repeat steps 1 and 2. Verify that the drive's terminator is installed and that the drive-select jumper is set to the DS1 position.**

    NOTE: Some diskette drives may require you to remove the drive from the computer to access the terminator and drive-select jumper.

    For information about the drive's terminator and drive-select jumper settings, refer to the documentation for the drive.

    Is the drive configured correctly?

    Yes. Go to step 18.

    No. Continue to step 15.

15. **Correct the drive-select jumper setting and terminator installation.**

16. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

17. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

    Do the tests complete successfully?

    Yes. You have solved the problem.

    No. Continue to step 18.

18. **See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.**

Troubleshooting a SCSI Tape Drive

A SCSI tape drive can be installed in one of the externally accessible drive bays or an external device that attaches to a SCSI host adapter connector on the back panel of the computer. In either case, the SCSI tape drive is controlled by a SCSI host adapter installed in the computer, which may also control other SCSI devices connected to one or more SCSI cables. SCSI devices often require device drivers for the particular operating system being used by the computer system.

Tape drive problems often result from a defective tape drive, a defective tape cartridge, or software. Follow these steps to troubleshoot a SCSI tape drive:

1. **Remove the tape that was in use when the problem occurred, and replace it with a tape that you know is not defective.**

    Is the problem resolved?

    Yes. The original tape was defective. Replace it with a new tape. You have fixed the problem.

    No. Continue to step 2.

2. **Verify that any required SCSI device drivers are installed on the hard-disk drive and are configured correctly.**

    See Chapter 3, "Installing and Configuring SCSI Drivers," in the system *User's Guide* for instructions on installing and configuring the SCSI device drivers for the system's built-in SCSI host adapter or Dell PowerEdge Expandable RAID Controller host adapter card. For any other type of SCSI host adapter card, see the documentation that accompanied the SCSI host adapter card.

    Is the problem resolved?

    Yes. The SCSI device drivers were installed or configured incorrectly or were corrupted. You have fixed the problem.

    No. Continue to step 3.

3. **Reinstall the tape backup software as instructed in the tape-backup software documentation.**

    Is the problem resolved?

    Yes. The tape backup software was corrupted. You have fixed the problem.

    No. Continue to step 4.

4. **Restart the system and check for the presence of the tape drive during the boot.**

   Is the problem resolved?

   Yes. The drive is correctly cabled and is receiving power. Go to step 9.

   No. Continue to step 5.

5. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

6. **Remove both computer covers.**

   See "Removing the Computer Covers" earlier in this chapter.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

7. **Check the SCSI cable connections to the tape drive and to the SCSI host adapter connector. If the tape drive is an internal device, check the DC power cable connection to the tape drive.**

   Are the cables firmly connected?

   Yes. Go to step 10.

   No. Continue to step 8.

8. **Reseat the cable connectors, replace the computer covers, reconnect the system to AC power, and turn it on.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Continue to step 9.

9. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources. Then remove the right computer cover.**

10. **Remove the tape drive. Then verify that the tape drive is configured for a unique SCSI identification (ID) number and that the tape drive is terminated or not terminated as appropriate.**

    See the documentation for the tape drive for instructions on selecting the SCSI ID and enabling or disabling termination. See "Installing SCSI Devices in the External Bays" in Chapter 9 for information about the tape drive.

    Is the tape drive configured correctly?

    Yes. Go to step 13.

    No. Continue to step 11.

11. **Reconfigure the tape drive's SCSI ID and termination settings as appropriate. Reinstall the tape drive, replace the computer covers, reconnect the system to AC power, and turn it on.**

    See "Installing SCSI Devices in the External Bays" in Chapter 9 for installing the tape drive.

    Is the problem resolved?

    Yes. The tape drive was configured incorrectly. You have fixed the problem.

    No. Continue to step 12.

12. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources. Then remove the computer covers.**

13. **Replace the SCSI cable that connects the tape drive to the SCSI host adapter. Replace the computer covers, reconnect the system to AC power, and turn it on.**

    Is the problem resolved?

    Yes. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting SCSI Hard-Disk Drives

Hard-disk drive problems can be caused by a number of conditions, including problems with the drive itself, the SCSI backplane board, or an interface cable.

Drive Indicator Error Codes

The SCSI backplane board monitors the internal SCSI hard-disk drives connected to the backplane board. In the event of a drive failure, systems using the optional Dell PowerEdge Expandable RAID Controller host adapter

will issue the following signals using the drive indicator lights adjacent to each SCSI hard-disk drive:

- If a drive shows signs of imminent failure, the drive online indicator turns off and the drive fault indicator blinks on briefly each second.
- If a drive has failed, the drive online indicator turns off and the drive fault indicator blinks off briefly each second.

Other drive indicator patterns are listed in Table 3-3, "SCSI Hard-Disk Drive Indicator Patterns," in Chapter 3.

Troubleshooting the SCSI Hard-Disk Drive

Use the following procedure to troubleshoot a hard-disk drive problem.

CAUTION: This troubleshooting procedure can destroy data stored on the hard-disk drive. Before you proceed, make sure you have backed up all the files on the hard-disk drive.

1. **If the on-board SCSI host adapter is being used to control the SCSI backplane board, restart the system and press <F1> when prompted to enter the system setup program.**

   See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for more information.

   Is the Onboard SCSI-A ROM Scan category set to Enable?

   Yes. Go to step 3.

   No. Continue to step 2.

2. **Change the Onboard SCSI-A ROM Scan category to Enable, and reboot the system.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Continue to step 3.

3. **Verify that the SCSI device drivers are installed and configured correctly.**

   See Chapter 3, "Installing and Configuring SCSI Drivers," in the system *User's Guide* to determine which drivers are required and how they should be installed and configured.

   Are the required SCSI device drivers installed and configured correctly?

   Yes. Go to step 5.

   No. Continue to step 4.

4. **Reinstall and/or reconfigure the required SCSI device drivers. Then reboot the system.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Continue to step 5.

5. **Remove the drive carrier from its bay, and check the cable connections between the drive and the drive carrier. Reinstall the drive.**

   See Chapter 10, "Installing Drives in the Internal Bays" for more information.

   Is the problem resolved?

   Yes. The drive carrier was not firmly seated in the connector on the SCSI backplane board, or the cable in the drive carrier was installed incorrectly. You have fixed the problem.

   No. Continue to step 6.

6. **Remove the drive carrier and install it in another drive bay.**

   Is the problem resolved?

   Yes. The SCSI backplane board has a defective connector. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Continue to step 7.

7. **Remove the computer covers.**

   See "Removing the Computer Covers" earlier in this chapter.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

8. **Check the SCSI cable connections to the SCSI backplane board and to the SCSI host adapter. Check the DC power cable connection to the SCSI backplane board.**

   The SCSI cable may be connected to the SCSI host adapter on the system board or to a SCSI host adapter card in an expansion slot. See Chapter 10, "Installing Drives in the Internal Bays," for the location of the cable connectors on the SCSI backplane board and the SCSI host adapter.

   Are the cables firmly connected?

   Yes. Go to step 10.

   No. Continue to step 9.

9. **Reseat the cable connectors, reconnect the computer and peripherals to their AC power sources, and turn them on.**

   Is the problem resolved?

   Yes. The cable connections were not properly connected. You have fixed the problem.

   No. Continue to step 10.

10. **Partition and logically format the hard-disk drive. If possible, restore the files to the drive.**

    You may need to use different programs than those provided with your operating system to partition and logically format SCSI hard-disk drives. See Chapter 3, "Installing and Configuring SCSI Drivers," in your system *User's Guide* for information and instructions.

    Is the problem resolved?

    Yes. The hard-disk drive format was corrupted. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Chapter 8
Installing System Board Options

This chapter describes how to install the following options:

- Extended Industry-Standard Architecture (EISA), Industry-Standard Architecture (ISA), and Peripheral Component Interconnect (PCI) expansion cards
- Memory upgrades
- Microprocessor upgrades

This chapter also includes instructions for replacing the real-time clock (RTC) chip, if necessary.

WARNING: Before a trained service technician accesses the inside of the computer, any and all power supplies must be disconnected from their power source, and the cables to the power supplies must also be disconnected. If this computer has more than one power supply, disconnect both power supply cords before servicing to avoid electrical shock.

Use Figure 8-1 to locate the system board features mentioned in this chapter and elsewhere.

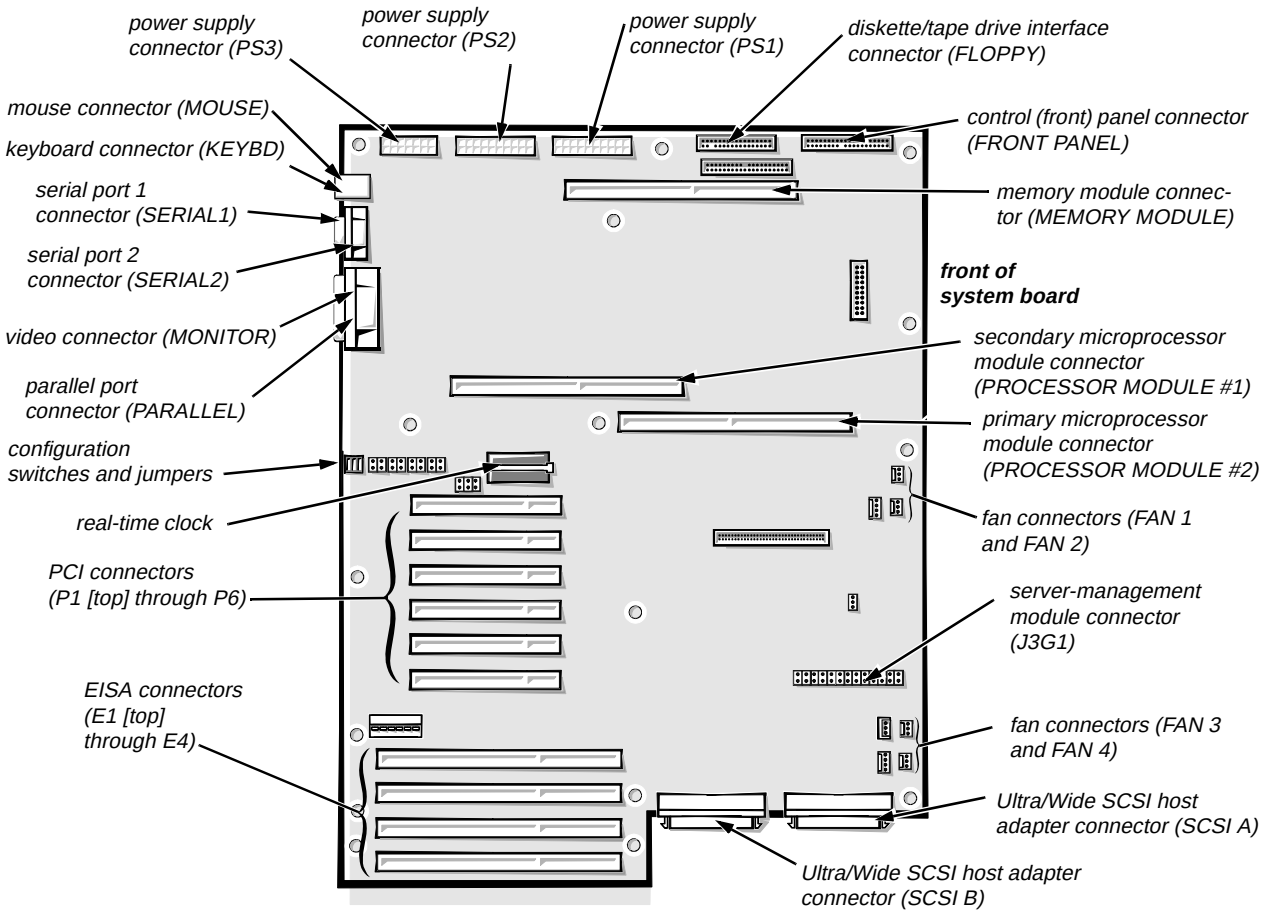
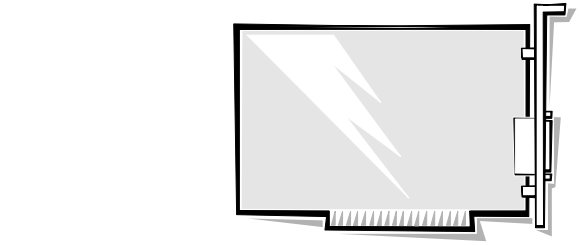

power supply connector (PS3)
power supply connector (PS2)
power supply connector (PS1)
diskette/tape drive interface connector (FLOPPY)
mouse connector (MOUSE)
keyboard connector (KEYBD)
control (front) panel connector (FRONT PANEL)
serial port 1 connector (SERIAL1)
memory module connector (MEMORY MODULE)
serial port 2 connector (SERIAL2)
front of system board
video connector (MONITOR)
secondary microprocessor module connector (PROCESSOR MODULE #1)
parallel port connector (PARALLEL)
primary microprocessor module connector (PROCESSOR MODULE #2)
configuration switches and jumpers
real-time clock
fan connectors (FAN 1 and FAN 2)
PCI connectors (P1 [top] through P6)
server-management module connector (J3G1)
EISA connectors (E1 [top] through E4)
fan connectors (FAN 3 and FAN 4)
Ultra/Wide SCSI host adapter connector (SCSI A)
Ultra/Wide SCSI host adapter connector (SCSI B)

Figure 8-1. System Board Features

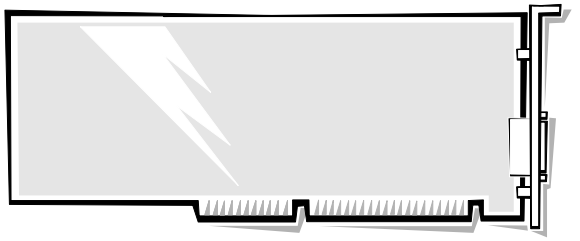
Expansion Cards

This computer can hold up to 10 expansion cards, six of which can be 32-bit PCI master cards. The system accommodates a mix of 32-bit EISA master or slave cards, 32-bit PCI master cards, and 8- and 16-bit ISA cards. Figure 8-2 shows examples of the different types of expansion cards.

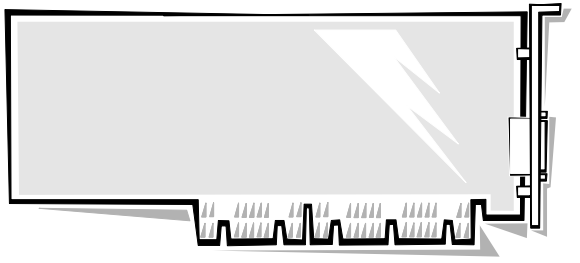
The system board contains a total of 10 expansion-card connectors. An opening is available in the back panel of the computer for each expansion-card connector, thus providing 10 usable expansion slots.



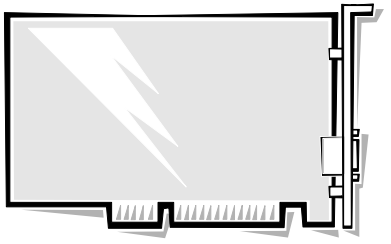
8-bit ISA expansion card



16-bit ISA expansion card



32-bit EISA expansion card



32-bit PCI expansion card

Figure 8-2. Expansion Cards

Connectors E1 through E4 support 32-bit EISA master or slave cards, and 8- and 16-bit ISA cards. Connectors P1 through P6 support 32-bit PCI master cards. Video expansion cards should be installed in connectors P1, P2, or P3.

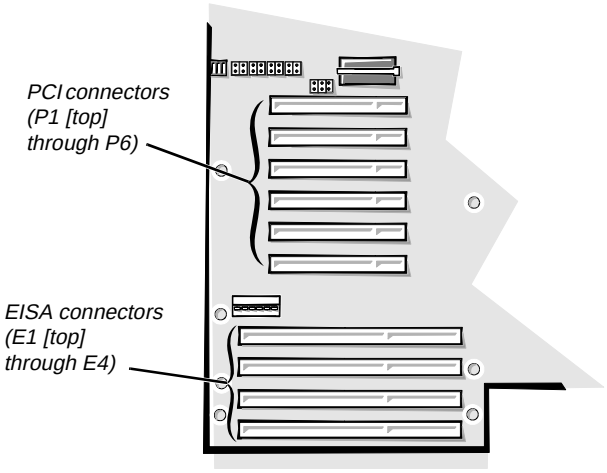


Figure 8-3. Expansion-Card Connectors on the System Board

Installing an Expansion Card

Follow this general installation procedure:

1. **If you are installing an ISA expansion card, start the system configuration utility and add the new expansion card to the configuration information.**

   See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for instructions.

   NOTES: If you are installing an EISA expansion card, you should normally run the system configuration utility ***after*** *installing the expansion card.*

   If you are installing a PCI expansion card, your system automatically performs any required PCI configuration tasks during the boot routine.

2. **Prepare the expansion card for installation, turn off and disconnect the computer and peripherals**

from their power sources, and remove the left computer cover.

See "Removing the Computer Covers" in Chapter 7.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing it for the system.

3. **Remove the screw and the metal filler bracket that covers the card-slot opening for the expansion slot you intend to use.**
4. **If the expansion card is full-length, check that the locking cam on the corresponding locking card guide is in the raised or "unlocked" position. Insert the end of the expansion card in the card guide slot and lower the card into the chassis.**
5. **Insert the card-edge connector firmly into the expansion-card connector on the system board.**
6. **When the card is firmly seated in the connector and the card-mounting bracket is flush with the brackets on either side of it, secure the bracket with the screw you removed in step 3.**

   If the expansion card is full-length, close the locking cam on the card guide to secure the card.
7. **Connect any cables that should be attached to the card.**

   See the documentation that came with the card for information about cable connections.
8. **Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.**
9. **If you have installed an EISA expansion card, start the system configuration utility and add the new expansion card to the configuration.**

   See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for instructions.

   NOTE: If you installed a PCI expansion card, the system automatically performs any required PCI configuration tasks during the boot routine.

Relocating or Removing an Expansion Card

Follow this general procedure to remove an expansion card:

1. **If you are relocating or removing an ISA expansion card permanently, start the system configuration utility and delete the expansion card from the configuration.**

   See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for instructions.
2. **Remove the left computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.
3. **If necessary, disconnect any cables connected to the card.**
4. **Remove the screw from the card-mounting bracket.**

   If the expansion card is full-length, release the locking cam on the card guide.
5. **Grasp the card by its top corners, and ease it out of its connector.**
6. **If you are removing the card permanently, use the screw you removed in step 4 to install a metal filler bracket over the empty card-slot opening.**

   NOTE: Installing a filler bracket over an empty expansion slot is necessary to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the computer and aid in proper cooling and airflow inside the computer.
7. **Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.**
8. **If you are relocating or removing an EISA expansion card, start the system configuration utility**

and delete the expansion card from the configuration information.

See Chapter 5, "Using the System Configuration Utility," in the system *User's Guide* for instructions.

NOTE: If you removed a PCI expansion card, the system automatically performs any required reconfiguration tasks during the boot routine.

Adding Memory

The 16 single in-line memory module (SIMM) sockets on the memory module can accommodate 64 to 2048 megabytes (MB) of dynamic random-access memory (DRAM). The Dell PowerEdge 6100 systems use 72-pin, 36-bit buffered SIMMs in these 72-pin sockets. The memory module connector is located near the top edge of the system board (see Figure 8-1).

Memory Upgrade Kits

The system is upgradable to 2048 MB (2 gigabytes [GB]) by installing combinations of 16- or 64-MB single-sided or 32-MB or 128-MB double-sided SIMMs. The SIMMs should be rated at 60 nanoseconds (ns) or 70 ns. Table 8-1 shows several sample memory configurations. Memory upgrade kits can be purchased from Dell as needed.

SIMM Installation Guidelines

The SIMM sockets are labeled "J1" through "J16" (see Figure 8-4). Slots J1 to J8 make up bank 1; slots J9 to J16 compose bank 2.

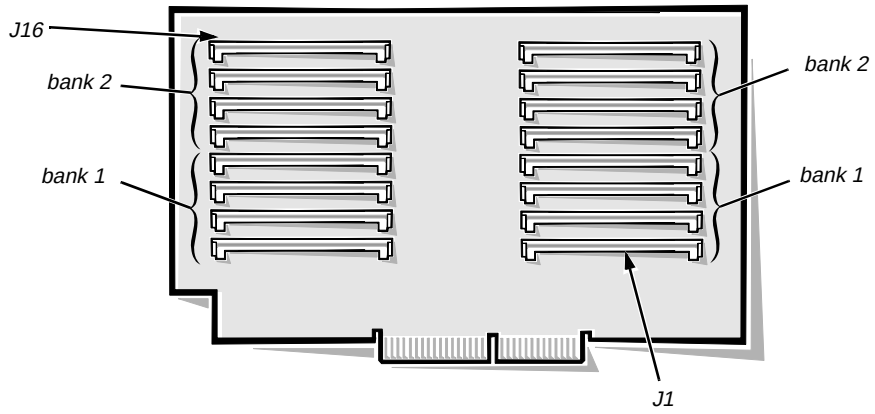


Figure 8-4. Memory Module and SIMM Sockets

When installing SIMMs, follow these guidelines:

- Install the SIMM with the pin 1 end aligned with the pin 1 end of the socket (see Figure 8-5).
- Install a SIMM in socket J1 before socket J2, socket J2 before socket J3, and so on.
- All SIMMs in one bank must be the same size and speed, but SIMMs in bank 1 may differ in size from those in bank 2.
- SIMMs must be installed in groups of four, eight, or 16 only.

The following SIMM interleaving is supported:

- Two-way interleaved using J1 to J4
- Four-way interleaved, single bank using J1 to J8
- Four-way interleaved, dual bank using J1 to J16

Table 8-1 illustrates the possible memory configurations based on these guidelines.

Table 8-1. Sample SIMM Configurations

Total Desired Memory	SIMMs Installed in Sockets			
	Bank 1		Bank 2	
	J1 to J4	J5 to J8	J9 to J12	J13 to J16
64 MB	16 MB	None	None	None
128 MB	32 MB	None	None	None
128 MB	16 MB	16 MB	None	None
256 MB	16 MB	16 MB	16 MB	16 MB
256 MB	64 MB	None	None	None
256 MB	32 MB	32 MB	None	None
384 MB	16 MB	16 MB	32 MB	32 MB
384 MB	32 MB	32 MB	16 MB	16 MB
512 MB	32 MB	32 MB	32 MB	32 MB
512 MB	64 MB	64 MB	None	None
512 MB	128 MB	None	None	None
640 MB	16 MB	16 MB	64 MB	64 MB
640 MB	64 MB	64 MB	16 MB	16 MB
768 MB	64 MB	64 MB	32 MB	32 MB
768 MB	32 MB	32 MB	64 MB	64 MB
1 GB	64 MB	64 MB	64 MB	64 MB
1 GB	128 MB	128 MB	None	None
1152 MB	16 MB	16 MB	128 MB	128 MB

Table 8-1. Sample SIMM Configurations *(continued)*

Total Desired Memory	SIMMs Installed in Sockets			
	Bank 1		Bank 2	
	J1 to J4	J5 to J8	J9 to J12	J13 to J16
1152 MB	128 MB	128 MB	16 MB	16 MB
1280 MB	32 MB	32 MB	128 MB	128 MB
1280 MB	128 MB	128 MB	32 MB	32 MB
1536 MB	64 MB	64 MB	128 MB	128 MB
1536 MB	128 MB	128 MB	64 MB	64 MB
2 GB	128 MB	128 MB	128 MB	128 MB

Performing a Memory Upgrade

Use the following procedure to perform a memory upgrade:

1. **Remove the left computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. **Remove the support panel.**

   Remove the two screws from the support panel (see Figure 7-4) and pull the back edge tabs on the panel out of the slots in the chassis.

3. **Remove the memory module.**

   Hold the module by the corners where the handles are and carefully pull the module out until the edge connectors are free from the system board connector.

   NOTE: Be careful not to touch components or gold edge connectors on the module.

4. **Place the memory module component-side up onto an antistatic surface.**

5. **Locate the SIMM sockets into which you will install or replace SIMMs.**

   Figure 8-4 shows the location of the SIMM sockets on the memory module.

6. **Install or replace the SIMMs as necessary to reach the desired memory total.**

   Follow the instructions in "Installing SIMMs" or "Removing SIMMs" later in this section, as appropriate.

7. **Replace the memory module.**

   Hold the module by the corners with the SIMM sockets facing down. Ease the module into the correct slot guides until it is touching the system board connector. Press the module carefully but firmly into the system board connector and rotate the handles closed.

   NOTE: Before closing the handles, make sure the memory module is aligned with the system board connector.

8. **Replace the support panel.**

   Align the panel so that the two tabs are to the left. Fit the tabs into the two slots on the chassis back and swing the panel closed. Replace the two screws removed in step 2.

9. **Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.**

   CAUTION: Make sure the memory module is completely seated in the system board connector before applying power. Incomplete insertion can damage to the system board and memory module.

   After the system completes the power-on self-test (POST) routine, it runs a memory test that displays the new memory total, which includes all newly installed memory.

   NOTE: If the memory total is incorrect, turn off and disconnect the computer and peripherals from their power sources, remove the computer cover and memory module, and check all the installed SIMMs to make sure they are seated properly in their sockets. Then repeat steps 7 through 9.

   The system detects that the new memory does not match the system configuration information, which is stored in nonvolatile random-access memory (NVRAM). The monitor displays an error message to that effect, ending with the following words:

   `Press <F1> to enter System Setup.`

10. **Press <F1> to enter the system setup program, and check the Extended Memory category in the Main menu of the system setup screens.**

    See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for more information.

    The system should have already changed the value in the Extended Memory category to reflect the newly installed memory. Verify the new total.

    NOTE: The value of Extended Memory is given in kilobytes. To convert kilobytes to megabytes, divide the kilobyte total by 1024.

    If the total is incorrect, one or more of the SIMMs may not be installed properly. Repeat this procedure again, checking to make sure the SIMMs are firmly seated in their sockets.

11. **Enter the system configuration utility. Then save the configuration and exit the utility.**

    Running the system configuration utility and saving the configuration is required for the system to recognize the newly installed SIMMs. See Chapter 5, "Using the System Configuration Utility," in the *User's Guide* for instructions on running the utility and saving the configuration.

12. **Run the RAM Test Group in the system diagnostics.**

    See Chapter 5, "Running the System Diagnostics," for information.

Installing SIMMs

The memory module has 16 SIMM sockets arranged in two banks. Install SIMMs starting with the bottom socket, J1, and work toward J16. All SIMMs in one bank must be the same size and speed, but SIMMs in bank 1 may differ in size from those in bank 2. If a SIMM is already installed in the socket you need, you must remove it. Follow the instructions in the next subsection, "Removing SIMMs," if appropriate.

To install a SIMM, follow these steps:

1. **Remove the memory module as described in steps 1 to 5 of "Performing a Memory Upgrade" earlier in this section and place the module with the system board connector pointed away from you.**

2. **Align the SIMM so that the notch is in the lower left corner.**

   The pin-1 end of the SIMM must align with the pin-1 end of the socket (see Figure 8-5).

3. **Hold the SIMM at a 45-degree angle with the top angled away from you and carefully press the SIMM into the socket until the SIMM is held by the clips (see Figure 8-5).**

   When properly inserted, the SIMM remains at an angle. If there is a gap between the clips and the SIMM, it is not installed properly and you must repeat step 3.

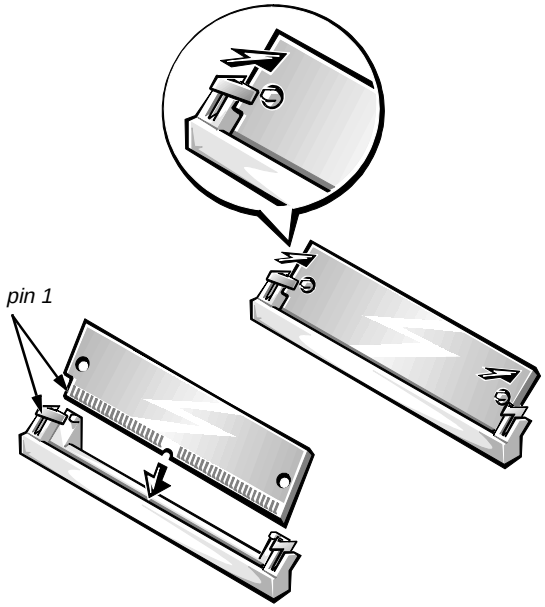


Figure 8-5. Installing a SIMM

4. **Continue with step 7 of "Performing a Memory Upgrade" earlier in this section.**

Removing SIMMs

To remove a SIMM, start from the highest-numbered socket, open the retaining clips just enough to lift the top edge of the SIMM away from the clips, and lift the SIMM out of the socket (see Figure 8-6).

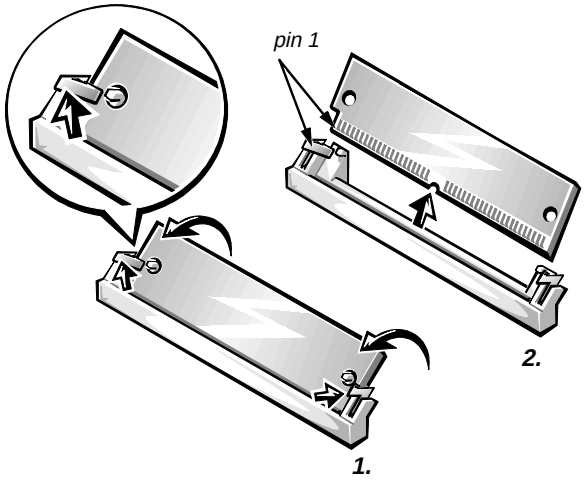


Figure 8-6. Removing a SIMM

Upgrading the Microprocessor or Installing Additional Microprocessors

The system board has two microprocessor module connectors. Each microprocessor module can have one or two Intel® Pentium® Pro microprocessors installed for a total of four microprocessors (see Figure 8-7). All microprocessors on both modules must be identical. For example, if the system has a 200 megahertz (MHz) Pentium Pro microprocessor and you are adding microprocessors, all additional microprocessors must also be 200 MHz Pentium Pro.

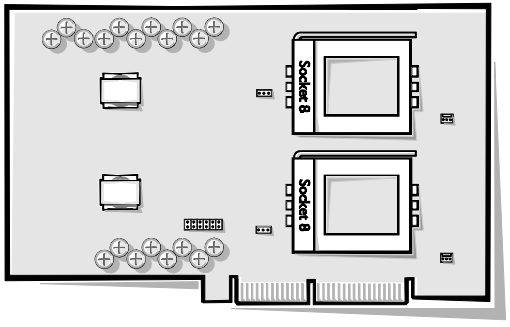


Figure 8-7. Microprocessor Module

Both microprocessor module sockets must be filled regardless of how many microprocessors are installed; you must use a bus termination module in the second socket if you have only one microprocessor installed. Note that both sockets on the primary module should be populated before populating the sockets on the secondary module. Table 8-2 shows the valid microprocessor configurations.

Similarly, both of the microprocessor module connectors on the system board must be populated. For example, if you are using only one or two microprocessors on one microprocessor module (thus populating the primary connector), the second connector on the system board must also be populated with either another microprocessor module or a terminator card.

Table 8-2. Valid Microprocessor Configurations

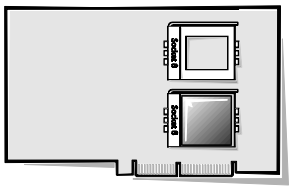
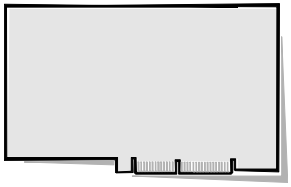
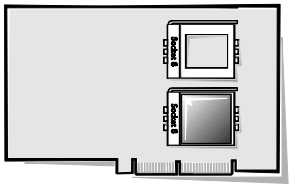
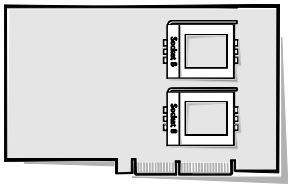
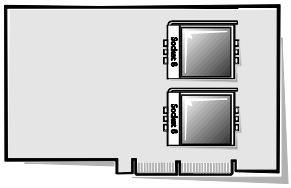
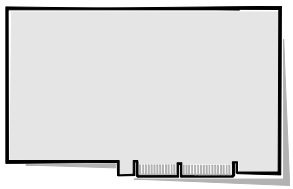
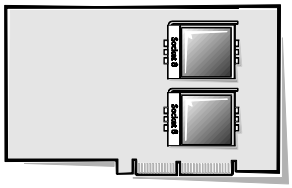
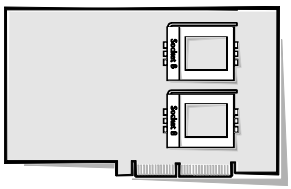
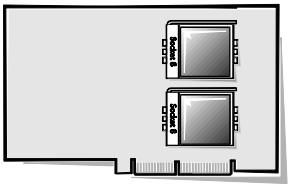
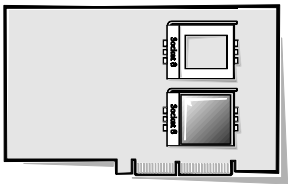
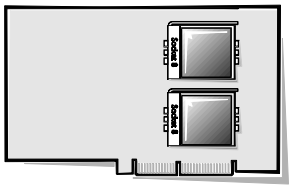
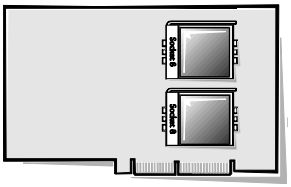
Number of Microprocessors	Microprocessor Module (Primary)	Microprocessor Module (Secondary)
1		
	1 microprocessor in lower socket	bus termination module
1		
	1 microprocessor in lower socket	empty microprocessor module
2		
	2 microprocessors in sockets	bus termination module
2		
	2 microprocessors in sockets	empty microprocessor module

Table 8-2. Valid Microprocessor Configurations *(continued)*

Number of Microprocessors	Microprocessor Module (Primary)	Microprocessor Module (Secondary)
3		
	2 microprocessors in sockets	1 microprocessor in lower socket
4		
	2 microprocessors in sockets	2 microprocessors in sockets

NOTE: If you decide to upgrade your system by installing additional microprocessors (up to four microprocessors total), you must order a microprocessor upgrade kit from Dell. Not all versions of the Pentium Pro microprocessor will work properly as an additional microprocessor. The upgrade kit from Dell contains the correct revision of the microprocessor chip for use as a additional microprocessor, as well as instructions for performing the upgrade. (A trained service technician must perform the upgrade.) All additional microprocessors must have the same internal operating frequency as the first.

The following items are included in a microprocessor upgrade kit:

- The new microprocessor chip
- A new heat sink
- A new heat sink clip
- A new snap-in badge

Use the following procedure to upgrade a microprocessor or install additional microprocessors.

1. **Remove the left computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. **Remove the support panel.**

   Remove the two screws from the support panel (see Figure 7-4) and pull the back edge tabs on the panel out of the slots in the chassis.

3. **Locate the microprocessor module or bus termination module you need to remove.**

   If you are replacing a microprocessor, prepare to remove the microprocessor module that contains the old microprocessor.

   If you are adding microprocessors, refer to the valid configurations in Table 8-2 and locate the appropriate microprocessor modules and/or bus termination module.

   If you are adding a second microprocessor module, prepare to remove the bus termination module or second microprocessor module.

4. **Remove the appropriate modules.**

   Hold the module by the corners where the handles are and carefully pull the module out until the edge connectors are free from the system board connector.

   NOTE: Be careful not to touch components or gold edge connectors on the module.

5. **If you are removing an old microprocessor, remove the metal clip that secures the heat sink to the microprocessor socket. If you are only adding microprocessors, go to step 8.**

   CAUTION: Never remove the heat sink from a microprocessor unless you intend to remove the microprocessor. The heat sink is necessary to maintain proper thermal conditions.

   WARNING: The microprocessor and heat sink can get extremely hot. Be sure the microprocessor has had sufficient time to cool before you touch it.

   Press down slightly and then out on the folded part of the clip with a small screwdriver to release the clip (see Figure 8-8).

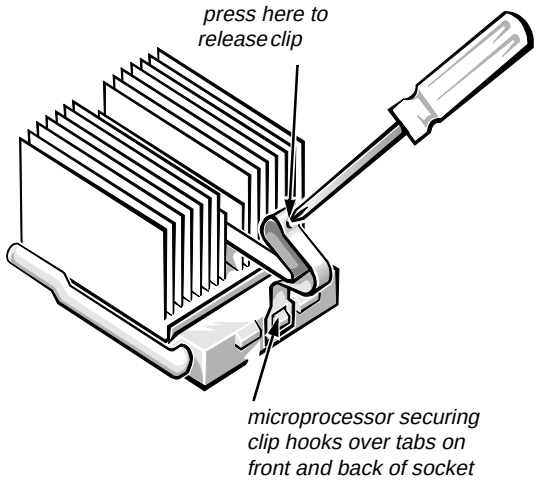


Figure 8-8. Microprocessor Securing Clip

6. **Remove the heat sink.**

   The thermal interface pad is bonded to the heat sink and will remain attached to the old heat sink.

7. **Remove the microprocessor from the socket.**

   CAUTION: Be careful not to bend any of the pins when removing the microprocessor from its socket. Bending the pins can permanently damage the microprocessor.

   To remove the microprocessor, pull the socket release lever straight up until the microprocessor is released (see Figure 8-9). Then lift the chip out of the socket. Leave the release lever up so that the socket is ready for the new microprocessor.

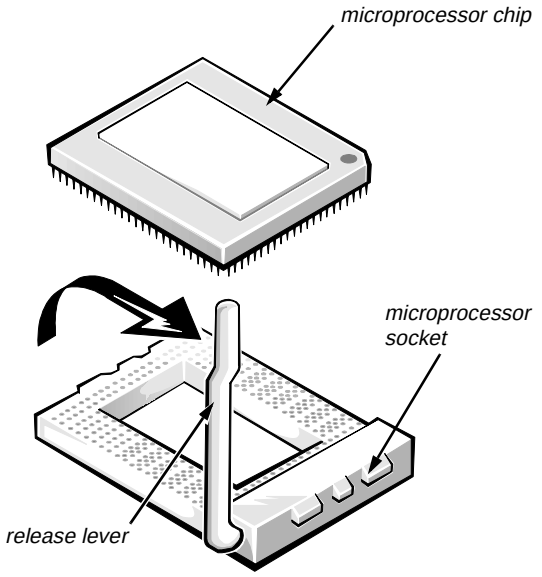


Figure 8-9. Removing the Microprocessor

8. **Unpack the new microprocessor.**

CAUTION: Be careful not to bend any of the pins when unpacking the microprocessor from its socket. Bending the pins can permanently damage the microprocessor.

If any of the pins on the microprocessor appear bent, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance from Dell.

9. **Make sure the release lever on the processor socket you are installing to is up so that the socket is ready for the new microprocessor.**

10. **Align the pin-1 corner of the microprocessor (see Figure 8-10) with the pin-1 corner of the microprocessor socket.**

NOTE: Identifying the pin-1 corners is critical to positioning the microprocessor correctly.

Identify the pin-1 corner of the microprocessor by locating the notched corner, which also has a dot on the top of the microprocessor.

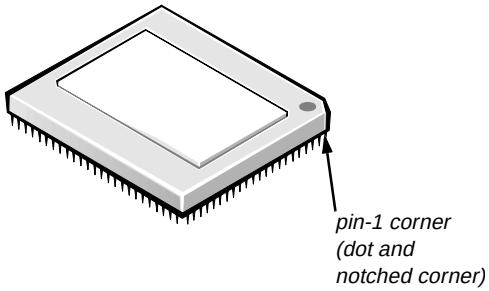


Figure 8-10. Pin-1 Identification

11. **Install the microprocessor in the socket (see Figure 8-11).**

CAUTION: Positioning the microprocessor incorrectly can permanently damage the chip and the computer when you turn on the system.

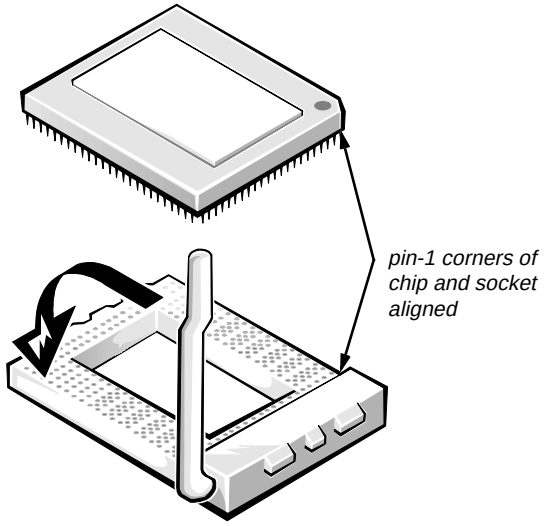


Figure 8-11. Installing the Microprocessor

With the pin-1 corners of the socket and microprocessor aligned, set the microprocessor lightly in the socket and make sure all pins are matched with the correct holes in the socket. When the microprocessor is positioned correctly, it should drop down into the socket with minimal pressure.

CAUTION: When placing the microprocessor in the socket, be sure that all of the pins on the chip go into the corresponding holes of the socket. Be careful not to bend the pins.

When the microprocessor is fully seated in the socket, rotate the socket release lever back down until it snaps into place, securing the chip.

12. **Place the new heat sink (with its bonded thermal interface pad) on top of the microprocessor (see Figure 8-12).**

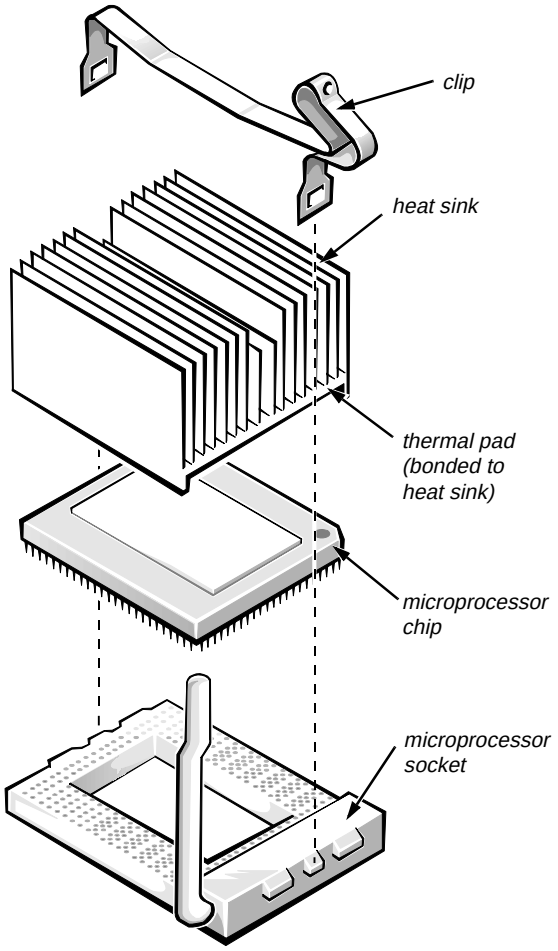


Figure 8-12. Installing the Heat Sink

13. **Replace the microprocessor securing clip.**

    Orient the clip as shown in Figure 8-12, and hook the unfolded end of the clip over the tab on the edge of the socket facing the front of the computer. Then press down on the folded end of the clip to snap the clip over the tab on the back of the socket.

14. **Replace the support panel.**

    Align the panel so that the two tabs are to the left. Fit the tabs into the two slots in the chassis back and swing the panel closed. Replace the two screws removed in step 2.

15. **Replace the left computer cover.**

16. **Reconnect your computer and peripherals to their power sources, and turn them on.**

    As the system boots, it detects the presence of the new microprocessor and automatically changes the system configuration information in the system setup program.

17. **Press <F1> to enter the system setup program, and check that the Slot 1: Processor 1, Slot 1: Processor 2, Slot 2: Processor 1, and Slot 2: Processor 2 categories in the Advanced menu match the new system configuration.**

    See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for instructions.

18. **Run the system diagnostics to verify that the new microprocessor is operating correctly.**

    See Chapter 5, "Running the System Diagnostics," for information.

Replacing the RTC Chip

The RTC chip has a built-in lithium battery that maintains system configuration, date, and time information in a special section of memory when the system is turned off.

The built-in battery can power the RTC chip for up to 10 years without a power source; the actual operating life of the battery depends on how the system is used (for example, if the system is on most of the time, the battery gets little use and thus lasts longer).

To determine if the RTC chip needs replacing, reenter the time and date through the system setup program. Turn off the system for a few hours, and then turn it on again. Enter the system setup program. If the date and time are not correct in the system setup program, replace the RTC chip.

NOTES: Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time kept in the system setup program, the problem may be caused by software rather than by a defective RTC chip.

The system can be operated without a RTC chip; however, the system configuration information maintained by

the RTC chip in NVRAM is erased each time the computer is turned off. Therefore, the system configuration information must be reentered and the options reset *each time the system boots* until the RTC chip is replaced.

To remove the RTC chip, follow these steps:

1. **If possible, enter the system setup program and make a printed copy of the system setup screens.**

   See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for instructions.

2. **Remove the left computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

> **CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.**

3. **Cut the cable tie that secures the chip to the system board.**

   NOTE: The cable tie binding the chip to the system board was necessary for shipping purposes. You will not need to replace the tie after replacing the RTC chip.

4. **Remove the RTC chip.**

> **WARNING: If the system has been running, any installed microprocessor and heat sink on the modules will be hot. To avoid the possibility of a burn, be careful when removing or installing system board components that are located near the microprocessors.**

> **WARNING: Replace the RTC chip only with the same or equivalent type recommended by the equipment manufacturer to avoid the danger of explosion. Discard the RTC chip according to the manufacturer's instructions.**

   Pry the RTC chip out of its socket an integrated circuit (IC) removal tool.

5. **Align the pin-1 corners of the RTC chip and the socket (see Figure 8-13).**

   NOTE: Identifying the pin-1 corners is critical to positioning the clock correctly.

   Identify the pin-1 corner of the RTC chip by locating the small dot in one corner on the top of the chip. The pin-1 corner of the socket is on the side with a notch.

6. **Install the new RTC chip.**

   With the pin-1 corners of the socket and chip aligned, set the chip lightly in the socket and make sure all pins are matched with the correct holes in the socket. When the chip is positioned correctly, press down until the chip is firmly in the socket.

> **CAUTION: When placing the RTC chip in the socket, be sure that all of the pins on the chip go into the corresponding holes of the socket. Be careful not to bend the pins.**

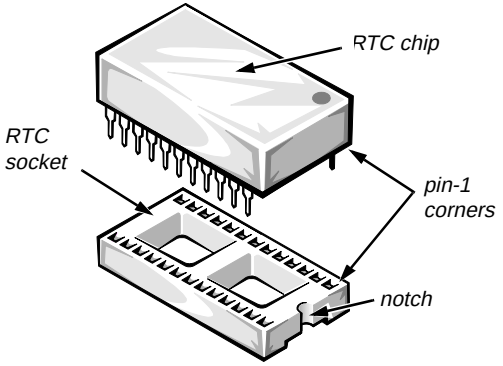


Figure 8-13. RTC Chip

7. **Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.**

8. **Enter the system setup program to confirm that the RTC chip is operating properly.**

   Enter the correct time and date through the system setup program's System Time and System Date categories on the Main menu. Also reenter any system configuration information that is no longer displayed on the system setup screens, and then exit the system setup program. See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for more information.

9. **Turn the computer and peripherals off, and leave them off for at least an hour.**

10. **After an hour, turn on the system and enter the system setup program. If the time and date are still incorrect, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.**

Chapter 9
Installing Drives in the External Bays

The external drive bays at the front of the Dell PowerEdge 6100 system hold up to four user-accessible, half-height 5.25- or 3.5-inch devices, typically diskette, tape, CD-ROM, or digital audio tape (DAT) drives. A 3.5-inch diskette drive and small computer system interface (SCSI) CD-ROM drive are standard in the first and second drive bays. The diskette drive is controlled by the system board's built-in diskette drive controller, whereas the CD-ROM drive is connected to the system board's built-in Ultra/Wide SCSI controller. Two additional drives can be installed in the remaining two external drive bays. See Figure 9-1 for a general view of the various drives, control cables, and power cables in the external drive bays.

WARNING: Before a trained service technician accesses the inside of the computer, any and all power supplies must be disconnected from their power source, and the cables to the power supply must also be disconnected. If this computer has more than one power supply, disconnect both power supply cords before servicing to avoid electrical shock.

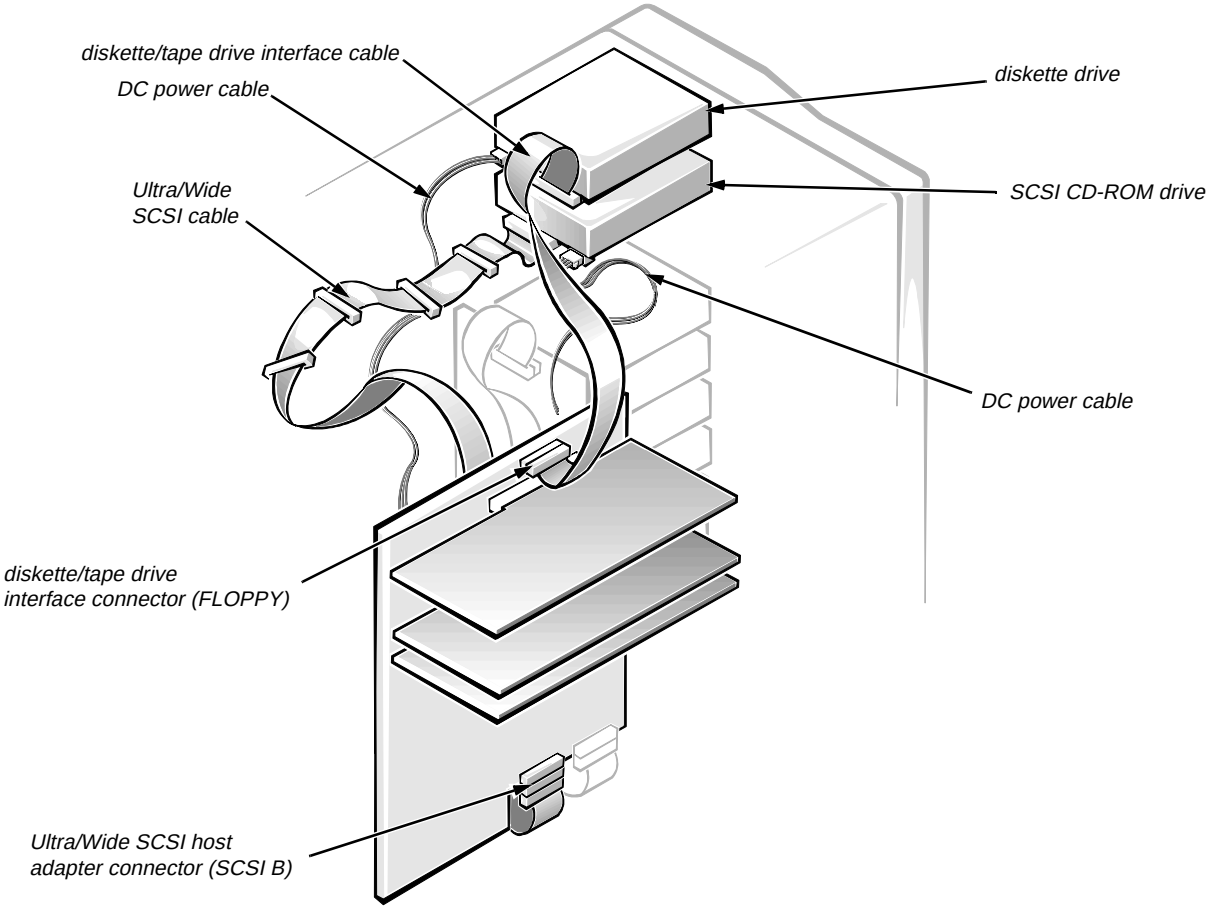


Figure 9-1. External Drive Bay Hardware

Before You Begin

This chapter describes how to install the following options:

- Drives that use the computer's built-in diskette drive controller.
- Tape drives that use a controller card

NOTE: If you are installing a SCSI hard-disk drive, see Chapter 10, "Installing Drives in the Internal Bays."

To remove or install drives in the external bays, you must remove both computer covers and front bezel according to the instructions in "Removing the Computer Covers" and "Removing the Front Bezel" in Chapter 7.

To protect the inside of the computer from foreign particles, a plastic front-panel insert covers each empty external drive bay. Before you install a drive in an empty bay, you must first remove the front-panel insert.

Whenever you remove a drive, be sure to replace the front-panel insert over the empty bay.

Removing and Replacing Front-Panel Inserts

To remove the front-panel insert for a drive bay you intend to use, first remove the front bezel as instructed in "Removing the Front Bezel" in Chapter 7. Then, facing the inside of the front bezel, press against the center of the insert with your thumbs until the insert bows sufficiently to loosen the tabs on the sides of the insert (see Figure 9-2). Pull the insert out of the bezel.

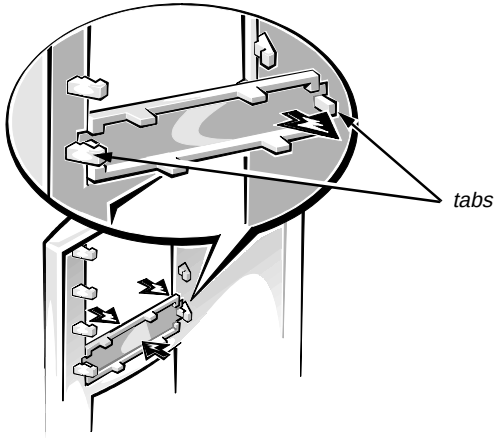


Figure 9-2. Removing a Front-Panel Insert

To replace a front-panel insert, position the insert over the bay opening from the inside of the front bezel and carefully press the insert into place. A tab on each side of the insert snaps into a corresponding latch on the inside of the front bezel.

Connecting the Drive

This section describes the power input connectors and interface connectors on the backs of most drives.

Figure 9-3 shows the 4-pin *power input connector*, where you connect a direct current (DC) power cable from the system power supply or power-supply paralleling board.

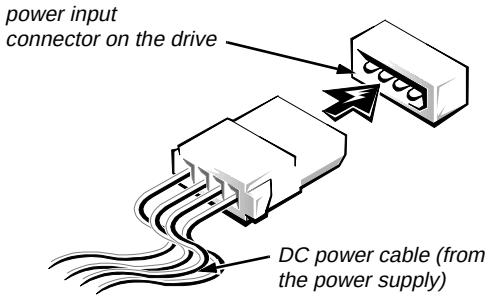


Figure 9-3. Power Connectors

The power connectors are *keyed* to avoid incorrect insertion; do not force two connectors together if they do not fit properly.

A ribbon cable (see Figure 9-4) functions as the interface cable for most types of drives.

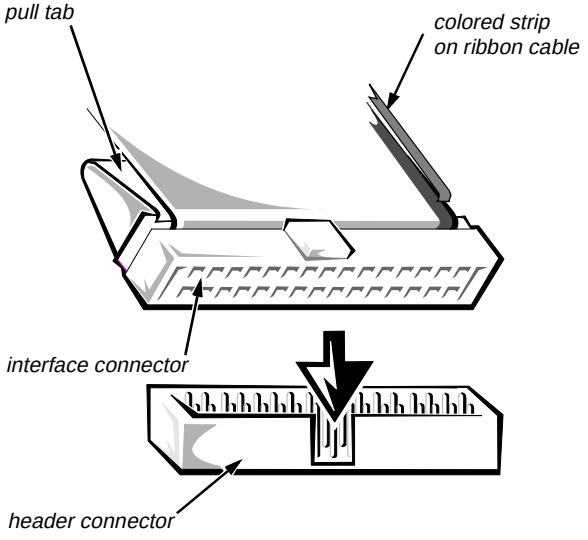


Figure 9-4. Header Connector

Most interface connectors are keyed for correct insertion; that is, a notch or a raised tab on one connector matches a tab or notch on the other connector. Keying ensures that the pin-1 wire in the cable (indicated by the colored strip along one edge of the cable) goes to the pin-1 ends of the connectors on both ends.

CAUTION: When connecting an interface cable, do not reverse the interface cable (do not place the colored strip away from pin 1 of the connector). Reversing the cable prevents the drive from operating and could damage the controller, the drive, or both.

DC Power Cables

Each drive in the external drive bays must connect to a 4-wire DC power cable from the system power supply or power-supply paralleling board. The connectors on this cable are labeled "FD1," "FD2," "FD3," "FD4," and "FD5." Connectors FD1 through FD4 are used for 5.25-inch devices, whereas connector FD5 is used for the standard 3.5-inch diskette drive. Before connecting a drive to a power cable, refer to Figure 9-5 to identify the correct cable connector to use for the drive.

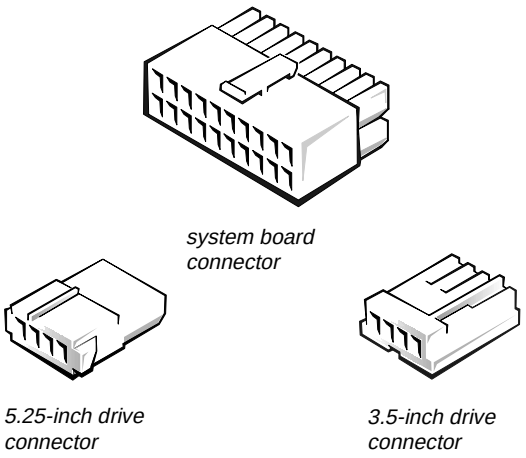


Figure 9-5. DC Power Cable Connectors

Installing SCSI Devices in the External Bays

SCSI devices in the external drive bay (such as CD-ROM drives and tape drives) are controlled by the Ultra/Wide SCSI controller on the system board.

SCSI Configuration Information

Although SCSI devices are installed essentially the same way as other devices, their configuration requirements are different. To configure SCSI devices installed in the external bays, follow the guidelines in the following subsections.

SCSI ID Numbers

Each device attached to the Ultra/Wide SCSI host adapter must have a unique SCSI identification (ID) number from 0 to 7.

When SCSI devices are shipped from Dell, the default SCSI ID numbers are assigned as follows:

- The computer's built-in Ultra/Wide SCSI host adapter is configured through the basic input/output system (BIOS) as SCSI ID 7.
- A SCSI tape drive is configured as SCSI ID 6 (the default ID number for a tape drive).
- A SCSI CD-ROM drive is usually configured as SCSI ID 5.

NOTE: There is ***no*** *requirement that SCSI ID numbers be assigned sequentially or that devices be attached to the cable in order by ID number.*

Device Termination

SCSI logic requires that the two devices at opposite ends of the SCSI chain be terminated and that all devices in between be unterminated.

Before installing SCSI devices in the computer, you must configure the terminators on the SCSI device(s) to conform to the following guidelines:

- A single SCSI device (such as the standard CD-ROM drive) is terminated.

- If two or more SCSI devices are installed, connect the devices as follows:
  - — Attach one of the devices to the end connector on the SCSI cable, and leave the terminator enabled on that device.
  - — The other end of the SCSI cable connects to the computer's built-in Ultra/Wide SCSI host adapter or to an optional SCSI host adapter card.
  - — Disable the terminators on all other devices you attach to the cable.

The standard SCSI CD-ROM drive is configured as the last device on the SCSI cable. Therefore, any additional devices attached to the cable should have their terminators disabled.

See the documentation provided with the SCSI device for information on disabling the device's terminator.

SCSI Cable

CAUTION: Dell recommends that you use only SCSI cables purchased from Dell. SCSI cables purchased elsewhere are not guaranteed to work reliably with the Dell PowerEdge 6100 systems.

The 50-pin SCSI cable has six connectors:

- The connector at the end of the cable farthest away from the other five connectors attaches to the SCSI host adapter connector labeled "SCSI B" on the system board.
- The five connectors on the cable attach to devices in the external drive bays.

The 50-pin "narrow" cable plugs in to the controller via an adapter.

Installing a SCSI Device

To install an external SCSI device that uses the built-in Ultra/Wide SCSI controller, follow these steps:

1. **Prepare the drive for installation.**

   Ground yourself by touching an unpainted metal surface on the back of the computer, unpack the drive, and compare the jumper and switch settings with those in the drive documentation. (See "SCSI Configuration Information" earlier in this section for information on setting the drive's SCSI ID number and enabling termination [if required].) Change any settings necessary for this system's configuration.

   If the drive does not already have drive rails attached, attach a drive rail to each side of the drive. Orient the drive rails as shown in Figure 9-6. Secure each drive rail to the drive with a screw in each of the *lower* slotted screw holes on the drive rail.

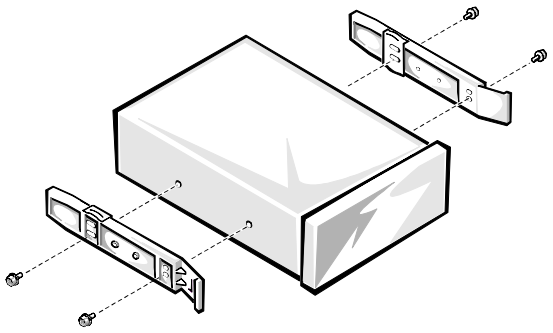


Figure 9-6. Attaching Drive Rails

2. **Remove the computer covers and front bezel.**

   See "Removing the Computer Covers" and "Removing the Front Bezel" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Slide the new drive into its bay until it snaps securely into place.**

   If necessary, you can adjust drive alignment by repositioning one or both rails.

4. **Connect a DC power cable and one of the connectors on the SCSI cable to the back of the drive (see Figure 9-7).**

   If other installed drives are in the way, temporarily move them out of the way. Press in on the plastic drive rails at the front of the bay to disengage a

drive, and then slide the drive slightly toward the front of the chassis.

Refer to "DC Power Cables" earlier in this chapter to determine the correct DC power cable connector to use for the drive. Plug the DC power cable connector into the 4-pin power input connector on the back of the drive.

Select the connector on the SCSI cable that most easily reaches the new SCSI device, and press the interface cable connector firmly into the drive's interface connector.

If you moved other drives at the beginning of this step, snap them back into place.

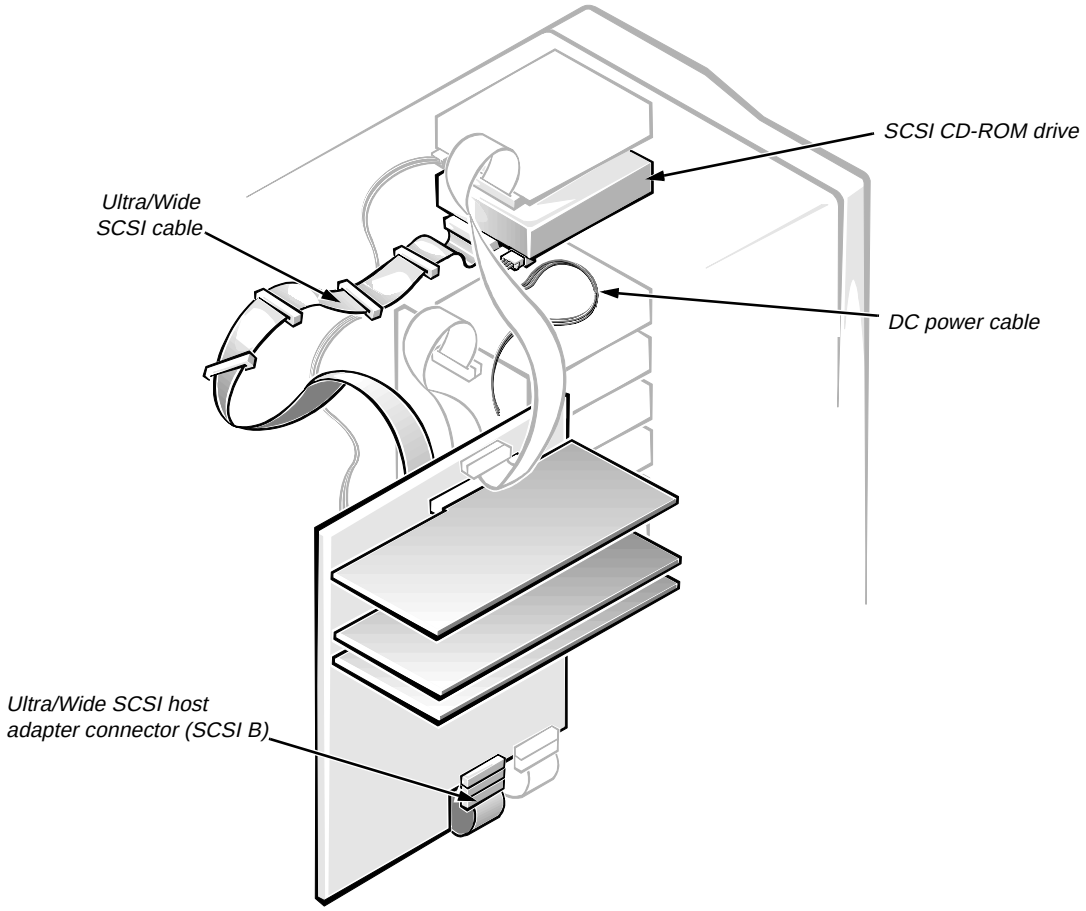


Figure 9-7. Cable Connections for a SCSI Device in the External Drive Bays

5. **Check all cable connections that may have been loosened during this procedure. Arrange cables so they will not catch on the computer cover or block the airflow of the fans or cooling vents.**
6. **If a front-panel insert on the computer cover blocks the bay in which you installed the drive, remove the insert.**

   See "Removing and Replacing Front-Panel Inserts" earlier in this chapter.
7. **Replace the front bezel and computer covers.**
8. **Reconnect the computer and peripherals to their power sources, and turn them on.**
9. **Test the SCSI devices.**

   To test a SCSI tape drive, refer to the documentation for the tape drive software to perform a tape drive backup and verification test.

Installing an Internal Tape Drive That Uses a Controller Card

Tape drives that require their own separate controller cards are shipped with the controller card and an interface cable. Install the drive in the third or bottom bay of the upper drive cage by performing the following steps:

1. **Configure the controller card if necessary.**

   Refer to the documentation accompanying the tape drive and the card. If the card incorporates jumpers or switches that must be set to work with the system, verify or change the settings as necessary.
2. **Remove the computer covers and front bezel.**

   See "Removing the Computer Covers" and "Removing the Front Bezel" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.
3. **Attach the drive rails to the drive, if necessary (see Figure 9-6).**
4. **Slide the new drive into its bay until it snaps securely into place.**

   If necessary, you can adjust drive alignment by repositioning one or both rails.
5. **Install the controller card in an expansion slot.**

   See "Installing an Expansion Card" in Chapter 8.
6. **Connect a DC power cable to the tape drive.**

   If other installed drives are in the way, disengage them by pressing in on the plastic drive rails at the front of the bay, and slide them slightly toward the front of the chassis.

   Refer to "DC Power Cables" earlier in this chapter to determine which DC power cable connector to use. Plug the DC power cable connector into the 4-pin power input connector on the back of the drive.
7. **Attach the interface cable that came with the drive kit to the connector on the back of the drive.**
8. **Route the other end of the interface cable through a cutout in the center wall of the chassis to the controller card, and connect the interface cable to the controller connector on the card.**

   Refer to the controller card's documentation to identify the controller connector on the card.
9. **If you moved other drives in step 5, snap them back into place.**
10. **Check all cable connections that may have been loosened during this procedure. Arrange cables so they will not catch on the computer cover or block the airflow of the fans or cooling vents.**
11. **If a front-panel insert on the computer cover blocks the bay in which you installed the drive, remove the insert.**

    See "Removing and Replacing Front-Panel Inserts" earlier in this chapter.
12. **Replace the computer bezel and covers.**
13. **Reconnect the computer and peripherals to their power sources, and turn them on.**

14. **Perform a tape backup and verification test with the drive as instructed in the tape-drive software documentation that came with the drive.**

    If the controller card is an Industry-Standard Architecture (ISA) or Extended Industry-Standard Architecture (EISA) expansion card, run the system configuration utility and update the system configuration. See Chapter 5, "Using the System Configuration Utility," in the *User's Guide* for instructions on running the utility and saving the configuration information.

    NOTE: You do not need to update the system configuration information for a tape drive attached to its own controller card.

Installing an External Tape Drive That Uses a Controller Card

Complete the following procedure to install an external tape drive that uses a controller card and shielded interface/DC power cable:

1. **Prepare the tape drive and controller card for installation.**

   Ground yourself by touching an unpainted metal surface on the back of the computer. Unpack the tape drive and controller card, and configure them for the system according to the instructions in the documentation that came with the tape drive.

2. **Remove both computer covers and the front bezel.**

   See "Removing the Computer Covers" and "Removing the Front Bezel" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Attach the drive rails to the drive, if necessary (see Figure 9-6).**
4. **Install the controller card in an expansion slot.**

   See "Installing an Expansion Card" in Chapter 8.

5. **Connect the tape drive's interface/DC power cable to the external connector on the controller card; secure the connection by tightening the screws on the connector.**
6. **Replace the computer covers and front bezel.**
7. **Reconnect the computer and peripherals to their power sources, and turn them on.**
8. **Perform a tape backup and verification test with the drive as instructed in the tape-drive software documentation that came with the drive.**

Chapter 10
Installing Drives in the Internal Bays

This chapter describes how to install and configure small computer system interface (SCSI) hard-disk drives in the computer's six internal drive bays. See Chapter 9, "Installing Drives in the External Bays," for information on installing SCSI CD-ROM drives and tape drives in the external drive bays.

WARNING: Before a trained service technician accesses the inside of the computer, any and all power supplies must be disconnected from their power source, and the cables to the power supply must also be disconnected. If this computer has more than one power supply, disconnect both power supply cords before servicing to avoid electrical shock.

Dell PowerEdge 6100 systems include a SCSI backplane board, which greatly simplifies cabling and configuration for SCSI hard-disk drives. All SCSI identification (ID) and termination for SCSI hard-disk drives are configured by the SCSI backplane board, rather than on individual drives.

In the standard Dell PowerEdge 6100 system configuration, the Ultra/Wide SCSI host adapter on the system board controls the SCSI backplane board. When used in combination with an optional PowerEdge Expandable RAID Controller host adapter card, the SCSI backplane board allows you to remove and insert hard-disk drives without shutting down the system—an invaluable feature for servers that contain important data and programs for an entire network of users. You can replace a failed drive without forcing all users on the network to log off and lose valuable time and possibly data. See "Removing and Inserting a SCSI Hard-Disk Drive With the System Running" later in this chapter for details.

CAUTION: Removing and installing hard-disk drives with the system running is *not* supported for systems *without* a PowerEdge Expandable RAID Controller host adapter card. Removing a drive in this situation will result in a loss of data.

Figure 10-1 illustrates the internal drive bays, SCSI backplane board, and the Ultra/Wide SCSI cable. The Ultra/Wide SCSI cable has two connectors:

- The connector at one end attaches to the SCSI host adapter connector labeled "SCSI A" on the system board or to an optional SCSI host adapter card such as the PowerEdge Expandable RAID Controller host adapter card.
- The connector at the other end of the cable attaches to the connector labeled "SCSI" on the SCSI backplane board.

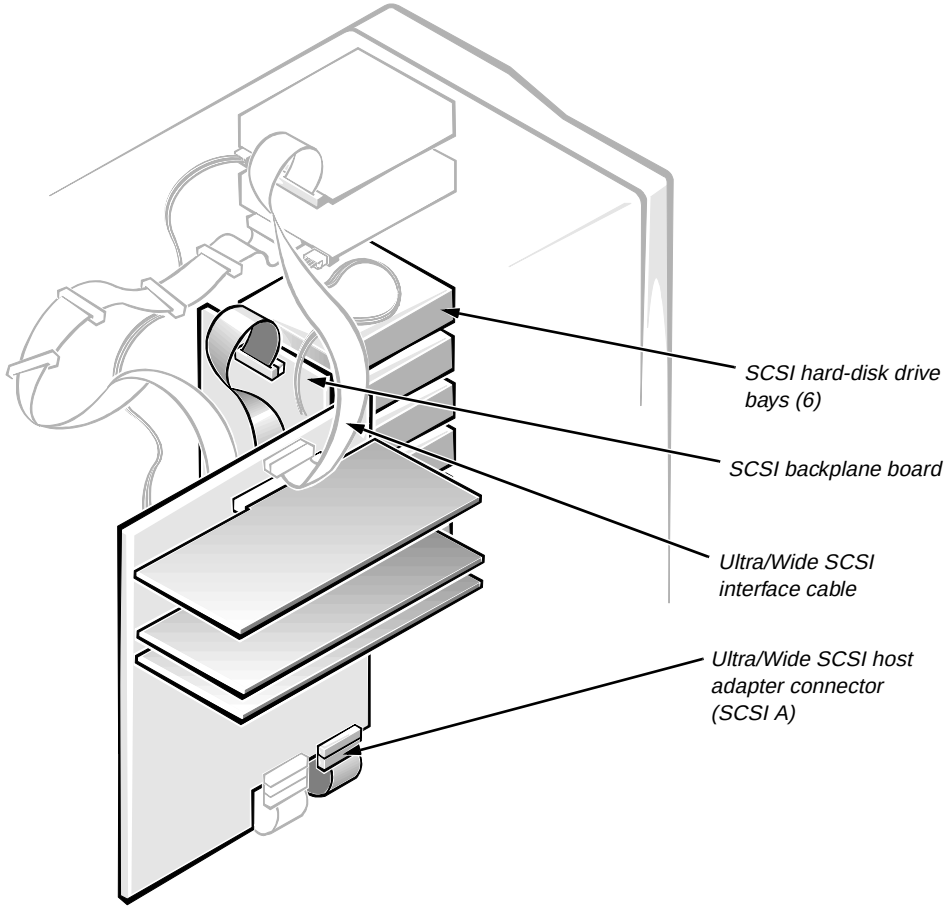

SCSI hard-disk drive bays (6)
SCSI backplane board
Ultra/Wide SCSI interface cable
Ultra/Wide SCSI host adapter connector (SCSI A)

Figure 10-1. Internal Drive Hardware

Installing SCSI Hard-Disk Drives in the Internal Drive Bays

SCSI hard-disk drives are supplied by Dell in special drive carriers that fit in the internal drive bays (see Figure 10-2). The printed circuit board at the back of the drive carrier acts as an interface between the SCSI hard-disk drive and the SCSI backplane board.

NOTE: Dell recommends that you use only drives that Dell has tested and approved for use with the SCSI backplane board.

SCSI Hard-Disk Drive Configuration

The SCSI backplane board provides termination for the SCSI bus. None of the drives connected to the SCSI backplane board should have their termination enabled. All SCSI ID numbers for the drives are set by the SCSI backplane board.

Removing and Installing a SCSI Hard-Disk Drive

The following subsections describe how to remove or install SCSI hard-disk drive carriers in the computer's internal drive bays.

Removing a SCSI Hard-Disk Drive

Remove a SCSI hard-disk drive from an internal drive bay as follows:

1. **If a PowerEdge Expandable RAID Controller host adapter card is *not* installed in the computer, turn off the system.**

   If a PowerEdge Expandable RAID Controller host adapter card is installed in the computer, see "Removing and Inserting a SCSI Hard-Disk Drive With the System Running" later in this section.

2. **Release the carrier by pulling down the plastic drive handle. Slide the carrier toward you until it is free of the drive bay.**

Installing a SCSI Hard-Disk Drive

Install a SCSI hard-disk drive in an internal drive bay as follows:

1. **If a PowerEdge Expandable RAID Controller host adapter card is *not* installed in the computer, turn off the system.**

   If a PowerEdge Expandable RAID Controller host adapter card is installed in the computer, see "Removing and Inserting a SCSI Hard-Disk Drive With the System Running" later in this section.

2. **Position the drive with its carrier side down and insert it, connector end first, into the bay (see Figure 10-2).**

3. **Holding the drive carrier by its sides, slide the drive into the bay.**

4. **When the pins on the drive carrier handle contact the drive bay, lift the handle to draw the drive carrier into the bay and lock the drive in place.**

   There is space available on the carrier for labelling purposes if needed.

5. **Install any required SCSI device drivers.**

   See Chapter 3, "Installing and Configuring SCSI Drivers," in the system *User's Guide* for information.

6. **Test the SCSI devices.**

   Run the SCSI Devices Test Group in the system diagnostics. See Chapter 5, "Running the System Diagnostics."

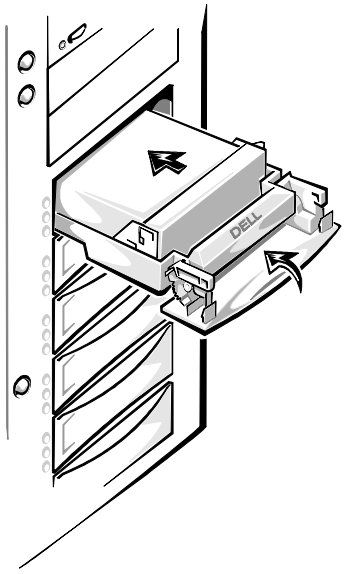


Figure 10-2. Installing a SCSI Hard-Disk Drive Carrier

Removing and Inserting a SCSI Hard-Disk Drive With the System Running

If the Dell PowerEdge 6100 system has a PowerEdge Expandable RAID Controller host adapter card installed and connected to the SCSI backplane board, you can remove and insert SCSI hard-disk drives while the system is running.

Before attempting to remove or insert a drive while the system is running, see the documentation for the Poweredge Expandable RAID Controller host adapter card to

ensure that the SCSI host adapter is configured correctly to support drive removal and insertion.

CAUTION: Removing and installing SCSI hard-disk drives with the system running is *not* supported for systems *without* a PowerEdge Expandable RAID Controller host adapter card. Removing a drive in this situation will result in a loss of data.

SCSI Hard-Disk Drive Indicator Patterns

The three light-emitting diode (LED) indicators adjacent to each of the six SCSI hard-disk drive bays provide information on the status of the SCSI hard-disk drives. The SCSI backplane firmware controls the drive online and drive fault indicators, whereas the drive access indicator is usually controlled by the drive itself.

See the "SCSI Hard-Disk Drive Indicator Codes" section in Chapter 3 and see Table 3-3 for more information.

Removing a SCSI Hard-Disk Drive With the System Running

Remove a SCSI hard-disk drive as follows:

1. **Wait until the drive status indicators adjacent to the drive bay signal that the drive can be removed safely.**

   If the drive has been online, the three drive indicators will flash sequentially as the drive is powered down. When all three indicators are turned off, the drive is ready for removal.

2. **Remove the hard-disk drive.**

   Follow the instructions in "Removing a SCSI Hard-Disk Drive," earlier in this section.

Inserting a SCSI Hard-Disk Drive With the System Running

Insert a SCSI hard-disk drive as follows:

1. **Remove the drive or empty carrier from the drive bay as described in the preceding subsection, "Removing a SCSI Hard-Disk Drive With the System Running."**

2. **Insert the new drive carrier into the bay.**

   Follow the instructions in "Installing a SCSI Hard-Disk Drive" earlier in this section.

   The drive online indicator turns on.

Installing a PowerEdge Expandable RAID Controller Host Adapter Card

Use the following procedure to install the PowerEdge Expandable RAID Controller host adapter card:

1. **Unpack the PowerEdge Expandable RAID Controller host adapter card, and prepare it for installation.**

   Refer to the documentation accompanying the host adapter card.

2. **Remove the left computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Install the PowerEdge Expandable RAID Controller host adapter card in one of the peripheral component interconnect (PCI) expansion slots.**

   See "Installing an Expansion Card" in Chapter 8.

4. **Disconnect the SCSI cable from the system board connector labeled "SCSI A" and connect the cable to the PowerEdge Expandable RAID Controller host adapter card (see Figure 10-3).**

   To identify the correct connector on the host adapter card, refer to documentation for the PowerEdge Expandable RAID Controller host adapter card.

   If you will be attaching external SCSI devices using the external SCSI connection slots on the computer's back panel, continue with steps 5 through 10.

   If you will not be attaching an external SCSI device in this manner, replace the computer cover,

reconnect the computer and peripherals to their power sources, and turn them on; then go to step 9.

NOTE: If SCSI devices are connected using the external SCSI connection slots, Ultra SCSI mode is not supported.

5. **Connect the SCSI external access cable from the host adapter kit to the Ultra/Wide SCSI host adapter connector (labeled "SCSI A") on the system board (see Figure 10-3).**

   See the documentation that came with each device for information on cabling that device as part of a daisy chain.

6. **Attach the other end of the SCSI external access cable to the computer's back panel. If you are attaching multiple external SCSI devices, daisy-chain the devices to each other using the cables shipped with each device (see Figure 10-4).**

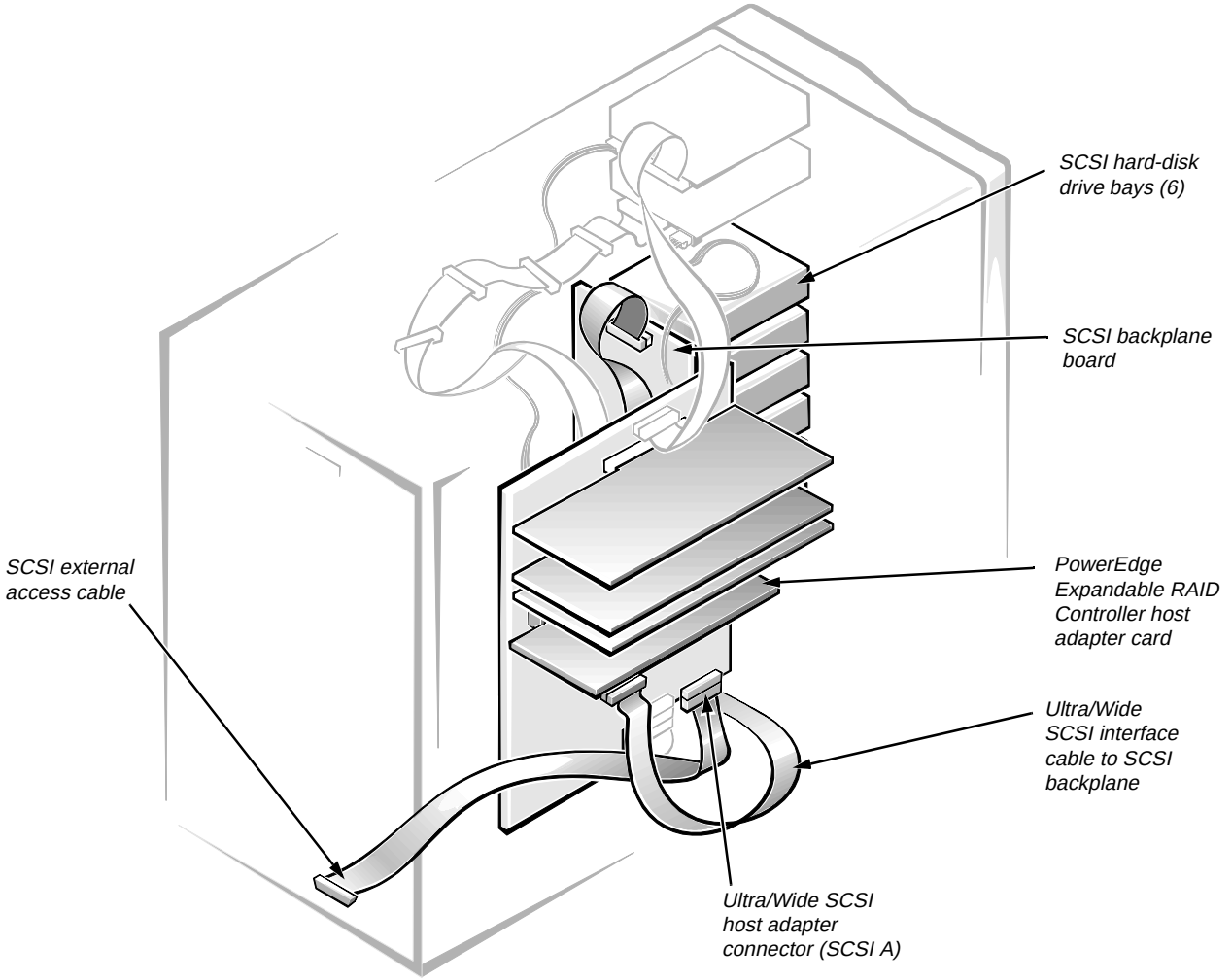

SCSI hard-disk drive bays (6)
SCSI backplane board
SCSI external access cable
PowerEdge Expandable RAID Controller host adapter card
Ultra/Wide SCSI interface cable to SCSI backplane
Ultra/Wide SCSI host adapter connector (SCSI A)

Figure 10-3. Cable Configuration for a PowerEdge Expandable RAID Controller Host Adapter Card

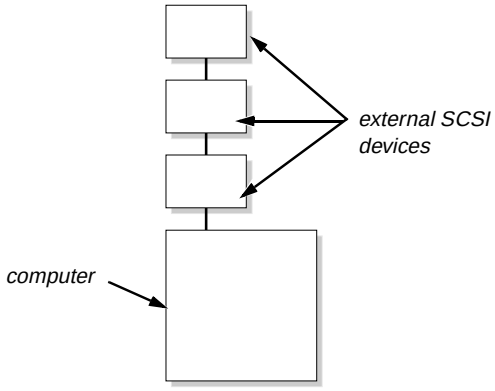


Figure 10-4. Daisy-Chaining External SCSI Devices

7. **Replace the left computer cover, and reconnect the computer and peripherals to their power sources.**

8. **Connect the external device(s) to power.**

   For each external device, plug the socket end of the power cable into the alternating current (AC) power receptacle on the back of the device. Plug the other end of the power cable into an AC power source.

9. **Install any required SCSI device drivers.**

   See Chapter 3, "Installing and Configuring SCSI Drivers," in the system *User's Guide* for information and instructions.

10. **Test the SCSI devices.**

    Test a SCSI hard-disk drive by running the SCSI Devices Test Group in the system diagnostics. See Chapter 5, "Running the System Diagnostics," for information.

    To test a SCSI tape drive, also refer to the documentation for the tape drive software to perform a tape drive backup and verification test.

Configuring the Boot Device

If the user plans to boot the system from a hard-disk drive, the drive must be attached to the primary (or boot) controller or SCSI host adapter card. See Chapter 4, "Using the System Setup Program," in the system *User's Guide* for more information and instructions.

Partitioning and Formatting SCSI Hard-Disk Drives

You may need to use different programs than those provided with the operating system to partition and format SCSI hard-disk drives. See Chapter 3, "Installing and Configuring SCSI Drivers," in the system *User's Guide* for information and instructions.

Chapter 11
Getting Help

This chapter describes the tools Dell provides to help you when you have a problem with your computer system. It also tells you when and how to call Dell Computer Corporation for technical or customer assistance in the following situations:

- *If you have a technical problem*, read the next section, "Technical Assistance."
- *If you are looking for information about a specific subject or about Dell's services*, read "Help Tools" later in this chapter.
- *If you have a problem with your order*, read "Problems With Your Order" later in this chapter.
- *If you need to return an item for warranty repair or credit*, read "Returning Items for Warranty Repair or Credit" later in this chapter.
- *If you would like to place an order or need information about additional products available from Dell*, call Dell at the appropriate telephone number listed in "Dell Contact Numbers" later in this chapter.

Technical Assistance

If you need assistance with a technical problem, perform the following steps:

1. **Review the documentation that accompanied your Dell system.**

   To decide which document has the answers you need, consult the Preface of the system documentation.

2. **Run the diagnostics for your Dell system.**

   See Chapter 5, "Running the System Diagnostics," for instructions on using the diagnostics.

3. **Make a copy of the Diagnostics Checklist (in Appendix A), and fill it out.**

   NOTE: Save the Diagnostics Checklist as a master so you can use it to make copies as needed.

   On your Diagnostics Checklist, document any error messages or beep codes as they occur so you can inform the Dell technician of them. Describe what you were doing when the error occurred. Note the steps you have taken to solve the problem.

4. **Use the AutoTech service for help with installation and troubleshooting procedures.**

   For instructions on using the AutoTech service, see "AutoTech Service" later in this chapter.

5. **If the preceding steps have not resolved the problem and you need to talk to a Dell technician, you can call Dell's customer technical support service.**

   For instructions on using the technical support service, see "Technical Support Service" and "Before You Call" later in this chapter.

Help Tools

Dell provides a number of tools to assist you. Table 11-1 lists subjects you may want information about, tasks you may want to perform, and the tool(s) you can use for help. Each tool is described later in this section.

Table 11-1. Help Tools

Subject or Task	Tool
BIOS revisions	TechConnect BBS
Frequently asked questions	AutoTech service
Information about Dell, its products, and its services	TechFax service, World Wide Web on the Internet
Installation instructions	System *User's Guide*, *Installation and Troubleshooting Guide*, technical support service, AutoTech service
Interrupt maps	TechFax service
Ordering parts	Technical support service, TechConnect BBS
Software update information	TechFax service
System board layouts	TechFax service, *Installation and Troubleshooting Guide*
Technical notes on system compatibility and revisions	TechFax service
Technical training class information	TechFax service
Technical specifications	TechFax service, system *User's Guide*
Troubleshooting, step-by-step instructions	*Installation and Troubleshooting Guide*, Dell system diagnostics, AutoTech service
Unresolved problems requiring assistance from a Dell technician	Technical support service, TechConnect BBS

NOTE: For the full name of an abbreviation or acronym used in this table, see the acronym and abbreviation list.

System Documentation

The *Installation and Troubleshooting Guide* includes information about system features, customizing the operation of the computer, and diagnosing and troubleshooting computer problems. The system *User's Guide* includes information on system features, small computer system interface (SCSI) device drivers, the system setup program, and the system configuration utility.

World Wide Web on the Internet

Dell can be accessed electronically on the Internet via a World Wide Web site, a file transfer protocol (FTP) site, and electronic mail (e-mail) using the following addresses:

- World Wide Web

  http://www.dell.com/

- Anonymous FTP

  ftp.dell.com/

  Log in as `user: anonymous`, and use your e-mail address as your password.

- Electronic Support Service

  support@dell.com

- Electronic Quote Service

  sales@dell.com

- Electronic Information Service

  info@dell.com

Commercial Online Services

Dell can also be accessed electronically via commercial online services, such as CompuServe®, PRODIGY®, America Online, and the Microsoft Network, by using the following addresses:

- CompuServe

  Type `GO DELL`.

- PRODIGY

  Select Manufacturer's Corner; then select Dell.

- America Online

  Use the keyword `DELL`.

- Microsoft Network

  From the Edit menu, select Go To, select Other Places, and then type `DELL`.

Dell Diagnostics Program

Every Dell computer comes with Dell diagnostics that can help you determine what is wrong with the computer when it does not operate correctly. This program provides valuable information for you and for Dell technicians should you need to call Dell.

See Chapter 5, "Running the System Diagnostics," for instructions on using the diagnostics. You can use this diagnostic program to test major components or devices in the computer, if it can boot.

AutoTech Service

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers.

When you call AutoTech, you use your touch-tone telephone to select the subjects that correspond to your questions. You can even interrupt an AutoTech session and continue the session later. The code number that the AutoTech service gives you allows you to continue your session where you ended it.

The information available through AutoTech includes:

- Specifications and prices for Dell computers currently on sale
- Installation instructions for Dell computers and peripherals
- Answers to questions about MS-DOS and the Microsoft Windows® 95 and Windows 3.*x* operating systems
- Help in troubleshooting your Dell computer

The AutoTech service is available 24 hours a day, seven days a week. You can also access this service through the technical support service. For the telephone number to call, see "Dell Contact Numbers" later in this chapter.

NOTE: AutoTech is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

TechFax Service

Dell takes full advantage of fax technology to serve you better. Twenty-four hours a day, seven days a week, you can call the Dell TechFax line toll-free for all kinds of technical information.

Using a touch-tone phone, you can select from a full directory of topics. The technical information you request is sent within minutes to the fax number you designate. TechFax information includes:

- Interrupt maps, system board layouts, and specifications.
- Technical notes on system compatibility and revisions.
- News on updates for operating systems and application programs.
- Descriptions of available technical training classes. For Dell-certified technicians, TechFax offers information such as parts lists, drawings, and maintenance and repair data.

For the TechFax telephone number, see "Dell Contact Numbers" later in this chapter.

NOTE: TechFax is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

TechConnect BBS

Use your modem to access Dell's TechConnect bulletin board service (BBS) 24 hours a day, seven days a week. The service is menu-driven and fully interactive. The modem settings for the BBS are 8 bit, no parity, 1 stop bit.

You can use the BBS to do the following:

- Send questions to a Dell technician
- Request a follow-up call or leave a message for a Dell technical support specialist
- Order parts
- Download basic input/output system (BIOS) and video driver upgrades
- Download updates

For the BBS telephone number, see "Dell Contact Numbers" later in this chapter.

NOTE: The TechConnect BBS is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

Automated Order-Status System

You can call this automated service to check on the status of any Dell products that you have ordered. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call, see "Dell Contact Numbers" found later in this chapter.

NOTE: The Automated Order-Status System is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

Technical Support Service

Dell's industry-leading hardware technical support service is open 24 hours a day, seven days a week. At any hour of any day, a Dell technical expert is ready with the answers to your questions about Dell hardware.

Our technical support staff pride themselves on their track record: more than 90 percent of all problems and questions are taken care of in just one toll-free call, usually in less than ten minutes. When you call, our experts can refer to records we keep on your specific Dell system to better understand your particular question. Our technical support staff use computer-based diagnostics to provide fast, accurate answers to your questions.

To contact Dell's technical support service, first refer to the section titled "Before You Call," and then call the number for your country as listed in "Dell Contact Numbers" later in this chapter. (For information about receiving technical assistance in the U.K., refer to the *Placing a Service Call* card that came with your computer.)

NOTE: Technical support services may vary outside the continental U.S. Contact your local Dell representative for more information.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell Computer Corporation for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call, see "Dell Contact Numbers" later in this chapter.

Product Information

If you need information about additional products available from Dell Computer Corporation, or if you would like to place an order, a sales specialist will be glad to help. For the telephone number to call, see "Dell Contact Numbers" later in this chapter.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1. **Call Dell to obtain an authorization number, and write it clearly and prominently on the outside of the box.**

   For the telephone number to call, see "Dell Contact Numbers" later in this chapter.

2. **Include a copy of the invoice and a letter describing the reason for the return.**

3. **Include a copy of the Diagnostics Checklist indicating the tests you have run and any error messages reported by the Dell diagnostics.**

4. **Include any accessories that belong with the item(s) being returned (power cables, software diskettes, guides, and so on) if the return is for credit.**

5. **Pack the equipment to be returned in the original (or equivalent) packing materials.**

   Include return shipping expenses. You are responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell Computer Corporation. Collect on delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at our receiving dock and returned to you.

Before You Call

Keep a record of your diagnostic and troubleshooting activities by photocopying the Diagnostics Checklist in Appendix A and filling it out whenever you experience a problem with the computer system.

NOTE: Be sure to save the checklist in Appendix A as a master, so you can use it to make copies as needed.

If you need to call Dell Computer Corporation for assistance, you will be able to inform the support technician of the actions you have taken to resolve the problem. If you must return a piece of hardware to Dell, a technician will assign a Return Material Authorization Number. Record the number on the checklist, and include the completed checklist in the shipping box.

Dell's technical support staff uses computer-based diagnostics to provide fast, accurate answers to your questions. When you call, the technical support staff refers to records regarding your specific Dell computer system to better understand your particular question.

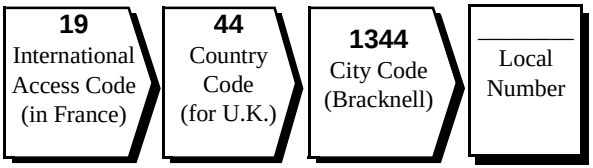
If possible, turn your system on before you call Dell for technical assistance and call from a telephone at or near the computer system. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the computer system itself.

Make sure the computer system's user documentation is available. You should also have a flat-blade screwdriver or a quarter-inch nut driver available.

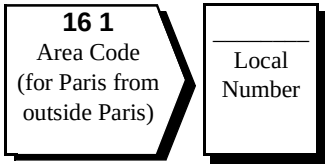
WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer.

Dell Contact Numbers

When you need to contact Dell, use the telephone numbers and codes provided in Tables 11-2 and 11-3. Table 11-2 provides the various codes required to make long-distance and international calls. Table 11-3 provides local telephone numbers, area codes, and toll-free numbers, if applicable, for each department or service available in various countries around the world. If you are making a direct-dialed call to a location outside of your local telephone service area, determine which codes to use (if any) in Table 11-2 in addition to the local numbers provided in Table 11-3. For example, to place an international call from Paris, France to Bracknell, England, dial the international access code for France followed by the country code for the U.K., the city code for Bracknell, and then the local number as shown in the following illustration.



To place a long-distance call within your own country, use area codes instead of international access codes, country codes, and city codes. For example, to call Paris, France from Montpellier, France, dial the area code plus the local number as shown in the following illustration.



The codes required depend on where you are calling from as well as the destination of your call; in addition, each country has a different dialing protocol. If you need assistance in determining which codes to use, contact a local or an international operator.

NOTE: Toll-free numbers are for use only within the country for which they are listed. Area codes are most often used to call long distance within your own country (not internationally)—in other words, when your call originates in the same country you are calling.

Table 11-2. International Dialing Codes

Country (City)	International Access Code	Country Code	City Code
Australia (Sydney)	0011	61	2
Austria (Vienna)	900	43	1
Belgium (Brussels)	00	32	2
Brunei	—	673	—
Canada (North York, Ontario)	011	—	Not required
China (Beijing)	—	86	10
Czech Republic (Prague)	00	42	2
Denmark (Horsholm)	009	45	Not required
Finland (Helsinki)	990	358	0
France (Paris) (Montpellier)	19	33	(1) (67)
Germany (Langen)	00	49	6103
Hong Kong	001	852	Not required
Ireland (Bray)	16	353	1
Italy (Milan)	00	39	2
Japan (Tokyo)	001	81	3

Table 11-2. International Dialing Codes *(continued)*

Country (City)	International Access Code	Country Code	City Code
Korea (Seoul)	001	82	2
Luxembourg	00	—	—
Macau	—	853	Not required
Malaysia (Penang)	007	60	4
Mexico (Colonia Granada)	95	52	5
Netherlands (Amsterdam)	00	31	20
New Zealand	00	64	—
Norway (Lysaker)	095	47	Not required
Poland (Warsaw)	011	48	22
Singapore (Singapore)	005	65	Not required
South Africa (Johannesburg)	09/091	27	11
Spain (Madrid)	07	34	1
Sweden (Upplands Vasby)	009	46	8
Switzerland (Geneva)	00	41	22
Taiwan	002	886	—
U.K. (Bracknell)	010	44	1344
U.S. (Austin, Texas)	011	1	Not required

Table 11-3. Dell Contact Numbers

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Australia (Sydney)	Customer Technical Support		toll free: 1-800-808-378
	Customer Care		toll free: 1-800-819-339
	Sales		toll free: 1-800-808-312
	Fax		toll free: 1-800-818-341
Austria* (Vienna)	Switchboard		0224334100-0
	Technical Support		0660-8779
Belgium* (Brussels)	Customer Technical Support		toll free: 0800 14856
	Customer Service	02	466 91 99
	Sales		toll free: 0800 16884
	SalesFax	02	466 47 89
	TechFax (International call to the Netherlands)		00 31 206829106
	TechConnect BBS (International call to the Netherlands)		00 31 206866504
Brunei	Customer Technical Support		60 4 810-4966
	Sales		60 4 810-4955

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).*

Table 11-3. Dell Contact Numbers *(continued)*

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Canada (North York, Ontario) *NOTE: Customers in Canada call the U.S. for access to TechConnect BBS.*	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Customer Care (From outside Toronto)		toll free: 1-800-387-5759
	Customer Care (From within Toronto)	416	758-2400
	Customer Technical Support (From outside Toronto)		toll free: 1-800-387-5757
	Customer Technical Support (From within Toronto)	416	758-2300
	Customer Account Services (Credit Return Authorization Numbers)		toll free: 1-800-387-5759
	Sales (Direct sales—from outside Toronto)		toll free: 1-800-387-5752
	Sales (Direct sales—from within Toronto)	416	758-2200
	Sales (Software and peripherals)		toll free: 1-800-667-7345
	Sales (Federal government, education, and medical)		toll free: 1-800-567-7542
	Sales (Major accounts)		toll free: 1-800-387-5755
	TechConnect BBS	512	728-8528
	TechFax		toll free: 1-800-950-1329
China (Beijing)	Sales		6846 1122
Czech Republic* (Prague)	Technical Support	02	8728 221
	Customer Service and Sales	02	879250
	TechConnect BBS	02	66710274

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).*

Table 11-3. Dell Contact Numbers *(continued)*

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Denmark* (Horsholm)	Customer Care, Technical Support, and Sales		toll free: 800 171 62
Finland* (Helsinki)	Customer Support and Technical Support		toll free: 0800-534 55
	Sales		toll free: 0800-33 55
France* (Paris/Montpellier)	Technical Support (Paris)	16 1	47 62 68 90 67 06 62 86
	Customer Care (Paris)	16 1	47 62 69 39
	Customer Care (Fax) (Paris)	16 1	47 62 60 03
	Customer Care (Fax) (Montpellier)	16	06 60 03
	TechFax (Montpellier)	16	22 53 11
	TechConnect BBS (Montpellier)	16	22 53 04
	Sales (Major accounts) (Paris)	16 1	47 62 69 00
	Direct Sales (Paris)	16 1	47 62 68 50 47 62 68 68
	Corporate Sales (Paris)	16 1	47 62 69 00
Germany* (Langen)	Customer Technical Support	06103	971-200
	Customer Care	06103	971-500
	TechConnect BBS	06103	971-666
	Sales	06103	971-460
Hong Kong	Customer Technical Support		toll free: 800 4107
	Sales		toll free: 800 4109

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).*

Table 11-3. Dell Contact Numbers *(continued)*

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Ireland* (Bray)	Customer Technical Support		1-850-543-543
	Sales		1-850-235-235
	SalesFax	01	286 2020
	Fax	01	286 6848
	TechConnect BBS	01	204 4761
	TechFax	01	204 4044
	Switchboard	01	286 0500
Italy* (Milan)	Switchboard		215.69.530
	Fax		215.69.444
Japan (Tokyo)	Technical Support	03	5466-3386
			toll free: 0120-1984-39
	Customer Care	03	5466-4750
	Sales	03	5466-6200
Korea (Seoul)	Technical Support		toll free: 080-200-3800
	Customer Service and Sales		toll free: 080-200-3600
	Fax		394 3122
	Switchboard		287 5600
Latin America *NOTE: Customers in Latin America call the U.S. for sales and technical assistance.*	Customer Technical Support	512	728-4093
	Customer Service	512	728-3619
	Fax (Technical Support and Customer Service)	512	728-3883
	Sales	512	728-4397
	SalesFax	512	728-4600
			728-3772

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).*

Table 11-3. Dell Contact Numbers *(continued)*

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Luxembourg* *NOTE: Customers in Luxembourg call Belgium for sales, customer assistance, and technical assistance, and they call the Netherlands for the SalesFax, TechFax, and TechConnect BBS services.*	Customer Technical Support (Brussels, Belgium)		toll free: 0800 2109
	Customer Service (Brussels, Belgium)	02	466 91 99
	Sales (Brussels, Belgium)		toll free: 0800 16884
	SalesFax (Brussels, Belgium)	02	466 47 89
	TechFax (Amsterdam, Netherlands)		682 91 06
	TechConnect BBS (Amsterdam, Netherlands)		686 65 04
Macau	Customer Technical Support		toll free: 0800 582
	Sales		toll free: 0800 581
Malaysia (Penang)	Customer Technical Support		toll free: 800 8298
	Sales		toll free: 800 8202
Mexico (Colonia Granada) *NOTE: Customers in Mexico call the U.S. for access to the Automated Order-Status System and AutoTech.*	Automated Order-Status System (U.S.)	512	728-0685
	AutoTech (U.S.) (Automated technical support)	512	728-0686
	Customer Technical Support	525	228-7870
	Sales	525	228-7811
			toll free: 91-800-900-37
			toll free: 91-800-904-49
	Customer Service	525	228-7878
	Main	525	228-7800
Netherlands* (Amsterdam)	Customer Technical Support		toll free: 06-0996663
	Direct Sales		toll free: 06-0663
	Direct SalesFax	020	682 7171
	Corporate Sales	020	581 8818
	Corporate SalesFax	020	686 8003
	TechFax	020	682 9106
	TechConnect BBS	020	686 6504

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).*

Table 11-3. Dell Contact Numbers *(continued)*

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
New Zealand	Technical Support		0800 446 255
	Sales		0800 441 567
	Fax		0800 441 566
Norway* (Lysaker)	Customer Technical Support and Customer Service		22-67 50 00
	Sales		67-125 711
Poland* (Warsaw)	Switchboard		620-7898
	Fax		620-4584
Singapore (Singapore)	Customer Technical Support		toll free: 800 6011 051
	Sales		toll free: 800 6011 054
South Africa (Johannesburg)	Switchboard		011 447-7567
	Fax		011 447 7549
Southeast Asian/ Pacific Countries (excluding Australia, Hong Kong, Japan, Malaysia, New Zealand, and Singapore—see individual listings for these countries)	Customer Technical Support		60 4 810-4977
	Sales		60 4 810-4988
Spain* (Madrid)	Technical Support	91	902.100.130
	Customer Service	91	329 10 80
	TechConnect BBS	91	329 33 53
	Sales	91	902.100.185
	Switchboard	91	329 10 80

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).*

Table 11-3. Dell Contact Numbers *(continued)*

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Sweden* (Upplands Vasby)	Technical Support	08	590 05 199
	Customer Care	08	590 05 169
	TechConnect BBS	08	590 05 591
	Sales	08	590 05 185
Switzerland* (Geneva)	Technical Support (Swiss French)	022	979 01 50
	Technical Support (Swiss German)	022	979 01 55
	TechConnect BBS	022	979 01 88
			979 01 89
	Customer Service	022	979 01 50
Taiwan	Technical Support		toll free: 0080 651 226
	Sales		toll free: 0080 651 228
U.K.* (Bracknell)	Customer Technical Support (Dell Dimension™ systems)	01344	720109
	Customer Technical Support (Other systems)	01344	723723
	Customer Care	01344	720110
	TechFax	01344	723178
	TechConnect BBS	01344	723858
	Sales	01344	720000

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).*

Table 11-3. Dell Contact Numbers *(continued)*

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
U.S. (Austin, Texas)	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Customer Technical Support (Return Material Authorization Numbers—warranty repairs		toll free: 1-800-624-9896
	Dell Customer Service (Credit Return Authorization Numbers)		toll free: 1-800-624-9897
	Dell Sales		toll free: 1-800-247-4618
	DellWare®		toll free: 1-800-753-7201
	DellWare FaxBack Service	512	728-1681
	Fee-Based Technical Support		toll free: 1-800-433-9005
	Sales (Catalogs)		toll free: 1-800-426-5150
	Spare Parts Sales:		
	Dell Direct[1]		toll free: 1-800-274-1490
	Major Accounts[2]		toll free: 1-800-357-3355
	Fax		toll free: 1-800-727-8320
	TechFax		toll free: 1-800-950-1329
	TechConnect BBS	512	728-8528
	Switchboard	512	338-4400

[1] *Use this telephone number if your call is about a system purchased for home, personal, or small-business use.*

[2] *Use this telephone number if you are calling for an established Dell national account (have your account number handy), if you work for a governmental agency (local, state, or federal), or if you work for an educational or medical institution.*

Appendix A
Diagnostics Checklist

Before You Call...

Keep a record of your diagnostic and troubleshooting activities by photocopying the following checklist and filling it out whenever you experience a problem with your computer system.

If you need to call Dell Computer Corporation for assistance, you will be able to inform the support technician of the actions you have taken to resolve the problem. If you must return a piece of hardware to Dell, include the completed checklist. See Chapter 11, “Getting Help,” for information on obtaining technical assistance.

Be sure to save the following checklist in this appendix as a master, so you can use it to make copies of the checklist as needed.

Diagnostics Checklist

Name: _____ **Date:** _____

Address: _____ **Phone no.:** _____

Service tag (bar code on the back of the computer)**:** _____

Return Material Authorization Number (if provided by support technician)**:** _____

Operating system and version: _____

Peripherals: _____

_____

_____

Expansion cards: _____

_____

_____

Are you connected to a network? ☐ **yes** ☐ **no**

Network, version, and network card: _____

Programs and versions: _____

Start-up file contents:	**autoexec.bat**	**config.sys**
_____	_____	_____
_____	_____	_____

Error message or beep code: _____

Description of problem and troubleshooting procedures you performed: _____

_____

_____

_____

_____

Appendix B
Diagnostic Video Tests

The Video Test Group of the system diagnostics (see Chapter 5, "Running the System Diagnostics") consists of the following seven tests, each of which verifies a particular video function or group of functions:

- Video Memory Test — Checks the integrity of characters generated from data in the video memory.
- Video Hardware Test — Checks the functions of the cursor register and the horizontal and vertical retrace bit registers.
- Text Mode Character Test — Checks the video subsystem's ability to present text mode data.
- Text Mode Color Test — Checks the video subsystem's ability to present color in text modes.
- Text Mode Pages Test — Checks the video subsystem's ability to map and present all available video text pages on the monitor screen, one page at a time.
- Graphics Mode Test — Checks the video subsystem's ability to present graphics mode data and colors.
- Color Palettes Test — Checks the video subsystem's ability to display all available colors.
- Solid Colors Test — Checks the video subsystem's ability to show screens full of solid colors. Allows you to check for missing color subpixels.

All of these tests, except the Video Memory Test and the Video Hardware Test, are interactive. These interactive tests display images on the monitor screen and require the user to respond with the following steps:

1. **Examine a displayed image for correctness.**
2. **If an image is correct, type** y**.**
3. **If an image is incorrect, type** n**.**

The following sections describe each of the tests in the Video Test Group.

Video Memory Test

The Video Memory Test verifies the integrity of the video memory either on the system board or on a video expansion card. As the test runs, it describes which 64-kilobyte (KB) block of video memory is being tested. When a test is complete, a message indicates whether the video memory has passed or failed the test. This test does not require any interaction on your part.

Video Hardware Test

The Video Hardware Test verifies the operation of the cursor registers and the horizontal and vertical retrace bit registers. When a test is complete, a message indicates whether these registers have passed or failed the test. This test does not require any interaction on your part.

Text Mode Character Test

The Text Mode Character Test consists of a group of subtests that display printable characters and character attributes. The subtests check character quality and the monitor's ability to display the characters correctly on its screen. A prompt at the bottom of each screen asks the user to decide whether the display is satisfactory and to respond by typing y or n.

If you respond affirmatively to each subtest, the Text Mode Character Test passes. A negative response to any subtest causes the test to fail.

The following subsections describe the subtests of the Text Mode Character Test in the order in which they appear.

Character Attributes Subtest (80 x 25)

The 80-column x 25-line character attributes subtest displays four lines of text that demonstrate normal-intensity video, reverse video, intensified video, and blinking video.

Character Set Subtest (80 x 25)

The 80-column x 25-line character set subtest displays all 256 characters in the American Standard Code for Information Interchange (ASCII) character set in 80-column by 25-line text mode. Figure B-1 shows an example of the character set subtest screen.

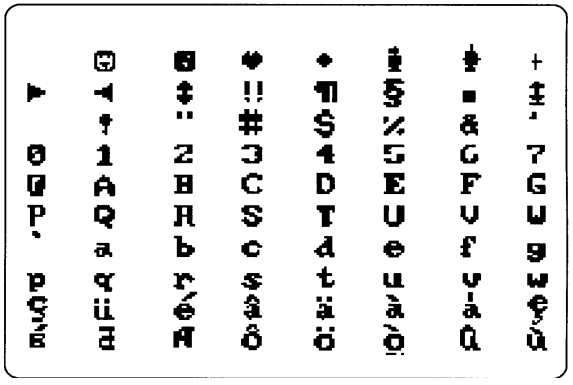


Figure B-1. 80-Column x 25-Line Character Set Subtest Screen

Character Attributes Subtest (40 x 25)

The 40-column x 25-line character attributes subtest displays four lines of text in 40-column by 25-line (double-wide) text mode that demonstrate normal-intensity video, reverse video, intensified video, and blinking video.

Character Set Subtest (40 x 25)

The 40-column x 25-line character set subtest displays all 256 characters in the ASCII character set in 40-column by 25-line (double-wide) text mode. Figure B-2 shows an example of the 40-column x 25-line character set subtest screen.

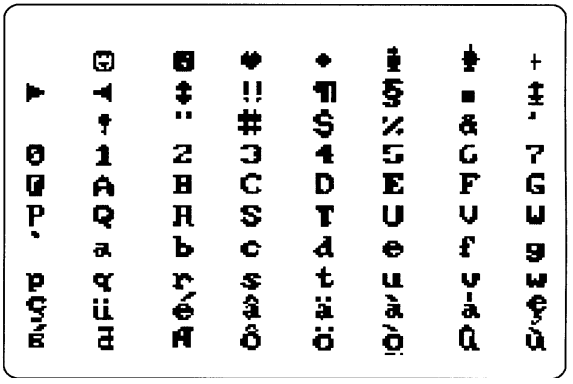


Figure B-2. 40-Column x 25-Line Character Set Subtest Screen

Text Mode Color Test

The Text Mode Color Test contains three subtests that check the video subsystem's ability to present color in text modes. The following subsections describe these subtests.

NOTE: These subtests are valid for color monitors only.

Color Attributes Subtest (80 x 25)

The 80-column x 25-line color attributes subtest displays a pattern of 16 rows and 16 columns in 80-column by 25-line text mode. Each row has a hexadecimal number in a unique foreground color and each column has a unique background color. Where the same foreground and background color intersect, the hexadecimal number is not visible. Type y if each character is displayed correctly; otherwise, type n. Table B-1 indicates the color in each of the rows and columns.

Table B-1. Color Attributes

Row or Column Color	Foreground Color	Background Number
0	Black	Black
1	Blue	Blue
2	Green	Green
3	Cyan	Cyan
4	Red	Red
5	Magenta	Magenta
6	Brown	Brown
7	White	White
8	Dark gray*	Black
9	Light blue*	Blue
A	Light green*	Green
B	Light cyan*	Cyan
C	Light red*	Red
D	Light magenta*	Magenta
E	Yellow*	Brown
F	Intense white*	White

* *These colors blink during the test.*

Color Attributes Subtest (40 x 25)

The 40-column x 25-line color attributes subtest is the same as the previous subtest except that the characters are displayed in 40-column by 25-line (double-wide) text mode. Type y if each character is displayed correctly; otherwise, type n.

Color Bars Subtest

The color bars subtest displays 16 bars in different colors with background intensity enabled. Under each bar is the name of the color that should be displayed. Type y if each color bar is displayed correctly; otherwise, type n.

Text Mode Pages Test

The Text Mode Pages Test checks the video subsystem's ability to map and present all available video pages on the monitor screen, one page at a time. The test displays eight successive screens, the first of which contains 21 lines of 77 zeros. The remaining seven screens are identical to the first, except that each screen substitutes a different numeral (1 through 7) for the zeros.

Type y if all the rows of numbers on each screen are displayed correctly; otherwise, type n.

Graphics Mode Test

The Graphics Mode Test checks the video subsystem's ability to present graphics mode data and colors. This test displays nine different screens, each of which allows you to check some aspect of graphics mode data and colors. The following subsections describe Graphics Mode Test screens in the order in which they appear.

NOTE: Some of the following tests may not appear if your system does not support the video mode being tested.

320 x 200 Graphics Mode Screens

The Graphics Mode Test displays two successive 320- x 200-pixel graphics mode screens: The first screen displays three pyramids in red, green, and yellow. The second screen displays three pyramids in magenta, cyan, and white. Type y if all the pyramids are the correct colors; otherwise, type n.

640 x 200 Black/White Graphics Mode Screen

The 640- x 200-pixel black/white graphics mode screen displays a black rectangle and a white rectangle on a gray background. Type y if the boxes are displayed correctly; otherwise, type n.

640 x 480 Monochrome Graphics Mode Screen

The 640- x 480-pixel monochrome graphics mode screen displays three chess pieces. Type y if all the chess pieces are identical and displayed correctly; otherwise, type n. Figure B-3 shows an example of this screen.

Figure B-3. 640 x 480 Monochrome Graphics Mode Screen

320 x 200 16-Color Graphics Mode Screen

The 320- x 200-pixel 16-color graphics mode screen displays a series of Xs in 16 different colors with the name of the color beneath each X. Type y if all the Xs are the correct colors; otherwise, type n.

640 x 200 16-Color Graphics Mode Screen

The 640- x 200-pixel 16-color graphics mode screen displays a series of hexagons in 16 different colors with the name of the color beneath each hexagon. Type y if all the hexagons are the correct colors; otherwise, type n.

640 x 350 16-Color Graphics Mode Screen

The 640 x 350 16-color graphics mode screen displays a series of octagons in 16 different colors with the name of the color displayed beneath each octagon. Type y if all the octagons are the correct colors; otherwise, type n.

640 x 480 2-Color Graphics Mode Screen

The 640- x 480-pixel 2-color graphics mode screen displays three chess pieces. Type y if all the chess pieces are identical and displayed correctly; otherwise, type n. Figure B-4 shows an example of this screen.

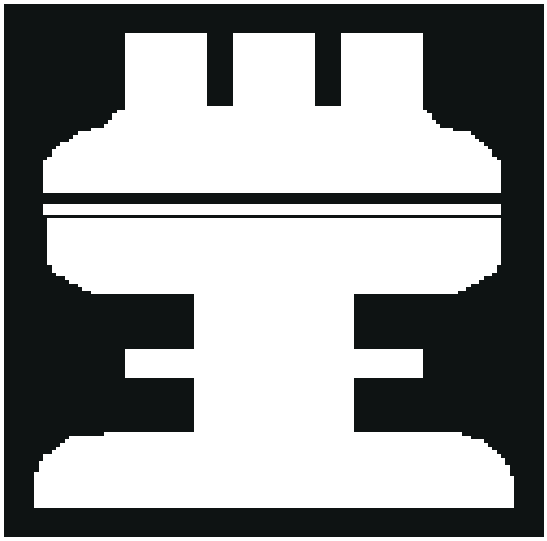


Figure B-4. 640 x 480 2-Color Graphics Mode Screen

640 x 480 16-Color Graphics Mode Screen

The 640- x 480-pixel 16-color graphics mode screen displays a series of stars in 16 different colors with the name of the color beneath each star. Type y if all the stars are the correct colors; otherwise, type n.

320 x 200 256-Color Graphics Mode Screen

The 320- x 200-pixel 256-color graphics mode screen displays a series of squares in 256 different color hues and intensities. Type y if all the squares are the correct colors; otherwise, type n.

640 x 480 256-Color Graphics Mode Screen

The 640- x 480-pixel 256-color graphics mode screen displays a series of squares with two colors in each square. Type y if all the squares appear to be correct; otherwise, type n.

800 x 600 16-Color Graphics Mode Screen

The 800- x 600-pixel 16-color graphics mode screen displays a series of pyramids in 16 different colors. Type y if all the pyramids appear to be correct; otherwise, type n.

800 x 600 256-Color Graphics Mode Screen

The 800- x 600-pixel 256-color graphics mode screen displays a series of squares with four colors in each square. Type y if all the squares appear to be correct; otherwise, type n.

1024 x 768 16-Color Graphics Mode Screen

The 1024- x 768-pixel 16-color graphics mode screen displays a series of hourglasses in 16 different colors. Type y if all the hourglasses appear to be correct; otherwise, type n.

1024 x 768 256-Color Graphics Mode Screen

The 1024- x 768-pixel 256-color graphics mode screen displays a series of asterisks with four colors in each asterisk. Type y if all the asterisks appear to be correct; otherwise, type n.

1280 x 1024 16-Color Graphics Mode Screen

The 1280- x 1024-pixel 16-color graphics mode screen displays a series of squares in 16 different colors located in various positions on the screen. Type y if all the squares appear to be correct; otherwise, type n.

Color Palettes Test

The Color Palettes Test checks the video subsystem's ability to display all available colors. The test displays two screens that allow you to check the quality of different shades of the basic colors and to test the monitor's ability to vary the intensity of these colors.

The first screen contains four sets of 64 squares, one for gray and one for each of the three basic colors (red, green, and blue). Each square contains a different shade of its associated color, ranging from very light to very dark. Type y if all the squares are the correct colors; otherwise type n.

The second screen is the red/green/blue (RGB) color combination screen. This screen allows you to test the monitor's ability to increase or decrease the intensity of the three basic colors.

The RGB color combination screen displays an RGB box in the top center of the screen with individual red, green, and blue boxes beneath it. Underneath the individual color boxes are three lines that show the intensity of each color. Type r, g, or b to adjust the intensity of the corresponding color; then press the right-arrow key to increase the color intensity, or press the left-arrow key to decrease the intensity. The RGB box should be able to display 262,144 different colors when you adjust the intensity levels of red, green, and blue. Type y if all the squares are the correct colors; otherwise type n.

Solid Colors Test

The Solid Colors Test checks whether the video subsystem is displaying the correct colors. This test also lets you check for missing pixels. When this test is running, four screens appear sequentially—a red screen, a green screen, a blue screen, and a white screen. Check each screen for missing pixels, and verify that the correct color is being displayed.

When the test is complete, a message asks if you are satisfied with the quality of the colors. Type y if all the pixels were present and if the correct colors were displayed; otherwise, type n.

Appendix C
Jumpers, Switches, and Connectors

This appendix provides specific information about the jumpers on the system board. It also provides some basic information on jumpers and switches and describes the connectors and sockets on the various boards in the computer.

Jumpers and Switches—A General Explanation

Jumpers and switches provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When reconfiguring the system, you may need to change jumper settings on the system board. You may also need to change jumper and/or switch settings on expansion cards or drives.

Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them.

Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit.

To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.

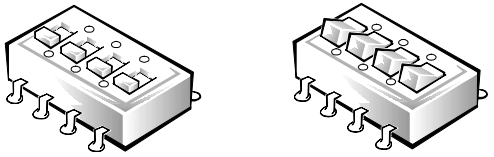
CAUTION: Make sure the system is turned off before you change a jumper setting. Otherwise, damage to the system or unpredictable results may occur.

A jumper is referred to as *open* or *unjumpered* when the plug is pushed down over only one pin or if there is no plug at all. When the plug is pushed down over two pins, the jumper is referred to as *jumpered*. The jumper setting is often shown in text as two numbers, such as *1-2*. The number *1* is printed on the circuit board so that you can identify each pin number based on the location of pin 1.

Figure C-1 shows the location and default settings of the jumper blocks on the system board. See Table C-1 for the designations, default settings, and functions of the system's jumpers.

Switches

Switches control various circuits or functions in the computer system. The switches you are most likely to encounter are dual in-line package (DIP) switches, which are normally packaged in groups of two or more switches in a plastic case. Two common types of DIP switches are *slide* switches and *rocker* switches (see the following illustration).



slide switches *rocker switches*

Each of these switches has two positions, or *settings* (usually *on* and *off*). To change the setting of a slide switch, use a small, pointed object such as a small screwdriver or a straightened paper clip to slide the switch to the proper position. To change the setting of a rocker switch, use the screwdriver or paper clip to press down

on the appropriate side of the switch. In either case, do not use a pen, pencil, or other object that might leave a residue on the switch.

System Board

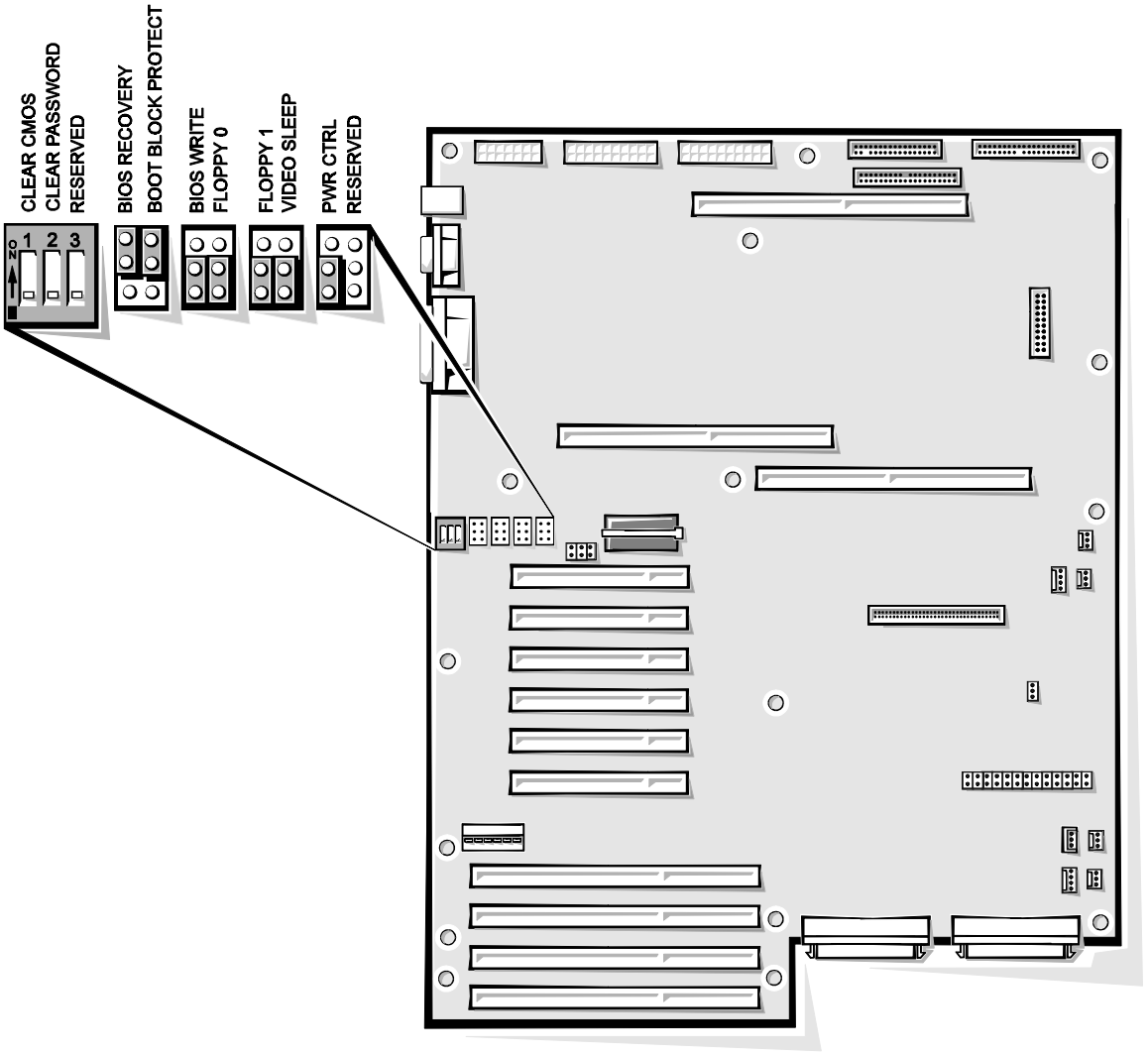


Figure C-1. System Board Jumpers and Switches

Table C-1. System-Board Jumper and Switch Settings

Jumper/Switch	Setting		Description
CLEAR CMOS			Settings in CMOS and the real-time clock (RTC) are reset to factory defaults during reset.
		(default)	Settings in CMOS and the RTC are retained during reset.
CLEAR PASSWORD			Clears all passwords.
		(default)	Retains all passwords.
RESERVED		(default)	Reserved *(do not change)*.
BIOS RECOVERY		(default)	Normal BIOS boot operation.
			Enables recovery mode for BIOS flash memory (the BIOS WRITE jumper must also be in its default position).
BOOT BLOCK PROTECT		(default)	The BIOS boot block is write-protected. Always leave this jumper in this position.
			The BIOS boot block is programmable. Do *not* use this setting.
BIOS WRITE		(default)	Disables the BIOS update of flash memory.
			Enables the BIOS update of flash memory. *NOTE: Only qualified technicians should change this jumper because updating the BIOS requires a special utility.*

Table C-1. System-Board Jumper and Switch Settings *(continued)*

Jumper/Switch	Setting		Description
FLOPPY 0		(Dell default)	Enables 1.44-MB diskette drive size or autodetection. Disables 2.88-MB size detection.
			Enables forced 2.88-MB diskette drive size detection.
FLOPPY 1		(Dell default)	Enables 1.44-MB diskette drive size or autodetection. Disables 2.88-MB size detection.
			Enables forced 2.88-MB diskette drive size detection.
VIDEO SLEEP			The Video Sleep Register resides at 03C3H.
		(default)	The Video Sleep Register resides at 46E8H.
PWR CTRL			Disables the RTC power supply control.
		(default)	Enables power supply control using the RTC.
RESERVED			Reserved *(do not change)*.

* *Only one of these jumpers should have a jumper plug installed.*

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

jumpered *unjumpered*

System Board Labels

Table C-2 lists the connectors and sockets located on the system board.

Table C-2. System Board Connectors and Sockets

Connector or Socket	Description
E*n*	EISA expansion-card connectors
FAN*n*	Fan connectors
FLOPPY	Diskette/tape drive interface connector
FRONT PANEL	Control (front) panel cable connector
J3G1	Server-management module connector
KEYBD	Keyboard connector
MEMORY MODULE	Memory module connector
MONITOR	Video connector
MOUSE	Mouse connector
PARALLEL	Parallel port connector; sometimes referred to as *LPT1*
P*n*	PCI expansion-card connectors
PS*n*	Power supply connectors
PROCESSOR MODULE #*n*	Microprocessor module connectors
SCSI A	Ultra/Wide SCSI host adapter connector
SCSI B	Ultra/Wide SCSI host adapter connector
SERIAL*n*	Serial port connectors; sometimes referred to as *COM1* and *COM2*

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Microprocessor Module

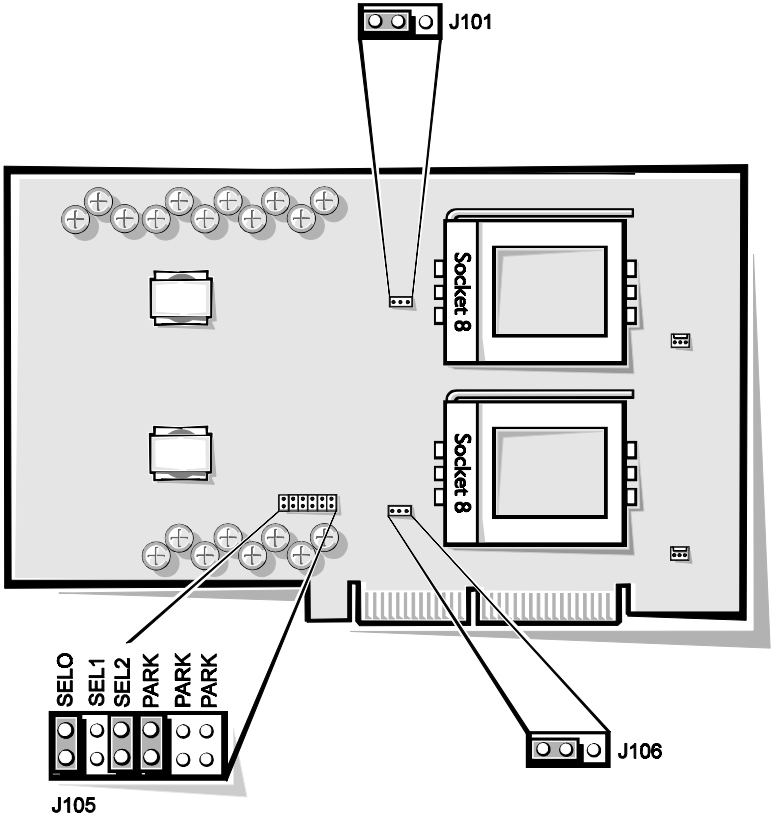
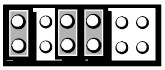


Figure C-2. Microprocessor Module Jumpers

See Table C-3 for the microprocessor module jumper settings.

Table C-3. Microprocessor Module Jumper Settings

Jumper	Setting		Description
J101		(default)	A processor is not installed in the adjacent slot. This jumper is useful only when you are using ITP.
			A processor is installed in the adjacent slot.
J105		(default)	A 200/66 MHz microprocessor is installed.
J106		(default)	A processor is not installed in the adjacent slot. This jumper is useful only when you are using ITP.
			A processor is installed in the adjacent slot.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

jumpered

unjumpered

SCSI Backplane Board

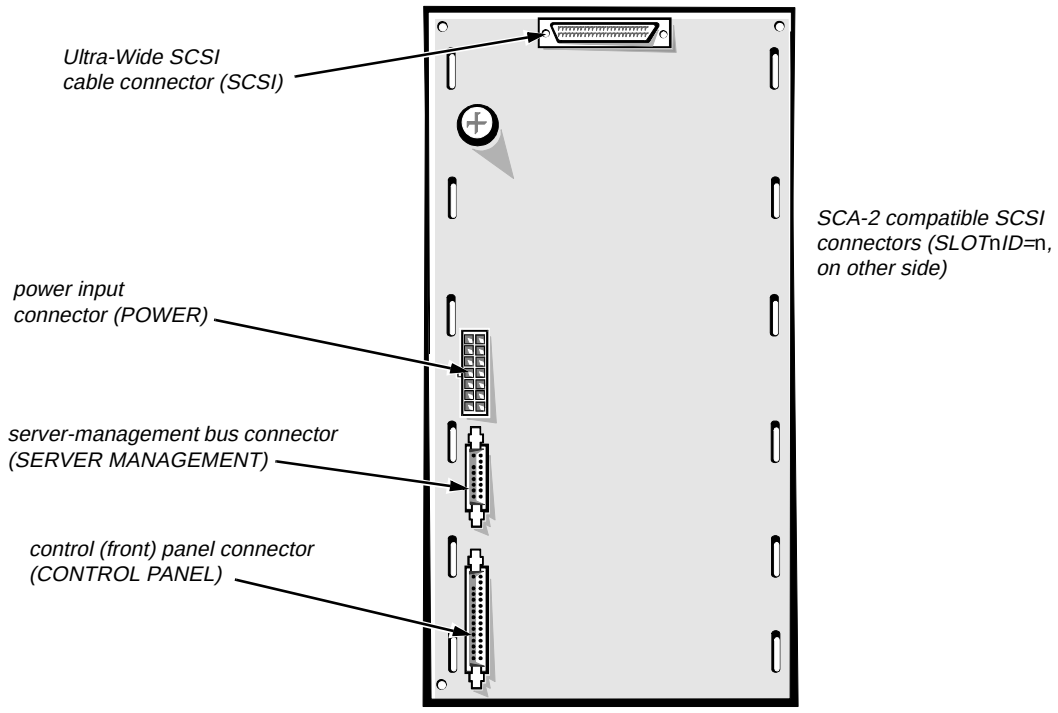


Figure C-3. SCSI Backplane Board

Table C-4 lists the connectors on the SCSI backplane board.

Table C-4. SCSI Backplane Board Connectors

Connector	Description
SLOT*n*ID=*n*	SCA-2 compatible SCSI connector
CONTROL PANEL	Control panel connector
POWER	Power input connector
SCSI	Ultra/Wide SCSI cable connector
SERVER MANAGEMENT	Server-management bus connector

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Power-Supply Paralleling Board

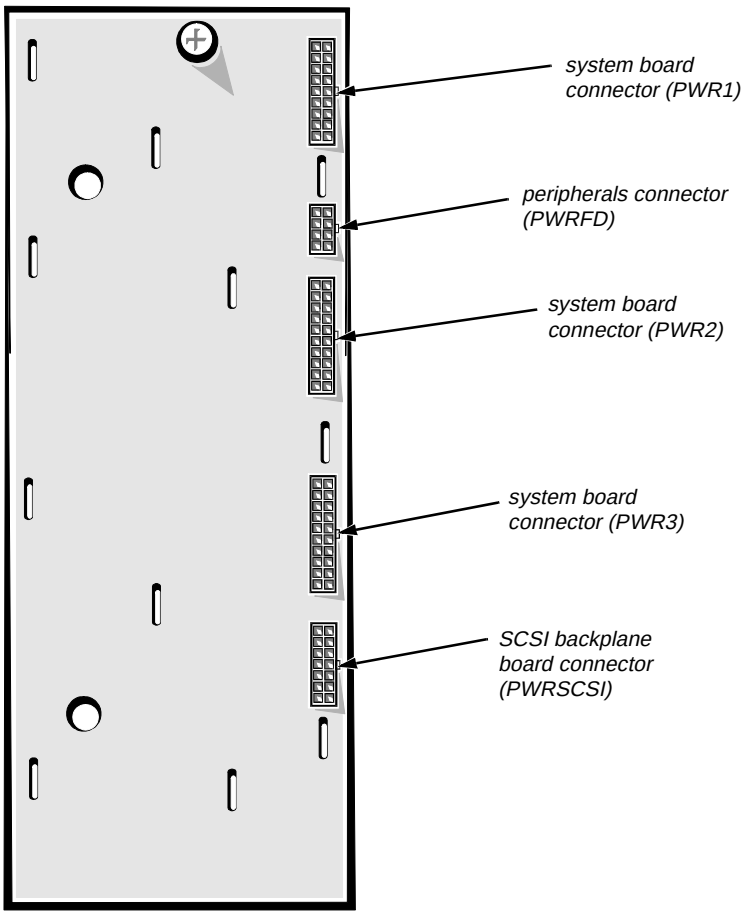

system board connector (PWR1)
peripherals connector (PWRFD)
system board connector (PWR2)
system board connector (PWR3)
SCSI backplane board connector (PWRSCSI)

Figure C-4. Power-Supply Paralleling Board

Table C-5 lists the connectors on the power-supply paralleling board.

Table C-5. Power-Supply Paralleling Board Connectors

Connector	Description
PWR *n*	System board connectors
PWRFD	Peripherals connector
PWRSCSI	SCSI backplane board connector

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Disabling a Forgotten Password

The computer's software security features include an administrative password and a user password, which are discussed in detail in Chapter 4, "Using the System Setup Program," of the system *User's Guide*. A password jumper on the system board enables these password features or disables them and clears any password(s) currently in use.

To disable a forgotten administrative password or user password, a trained service technician must perform the following steps:

1. **Disconnect the system from its power source and remove the computer covers.**

   See "Removing the Computer Covers" in Chapter 7 for instructions.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. **Refer to "Jumpers and Switches—A General Explanation" found earlier in this appendix for jumper information.**

   Figure C-1 shows the location of the CLEAR PASSWORD switch on the system board.

3. **Move the CLEAR PASSWORD switch to the On position.**

4. **Replace the computer cover, reconnect the computer to its power source, and turn it on.**

   The existing passwords are not disabled (erased) until the system boots with the CLEAR PASSWORD switch in the On position. However, before you assign a new administrative and/or user password, you must set the CLEAR PASSWORD switch back to the off position.

   NOTE: If you assign a new administrative and/or user password with the CLEAR PASSWORD switch still on, the system disables the new password(s) the next time it boots.

5. **Repeat step 1.**

6. **Move the CLEAR PASSWORD switch to the off position (away from the numbers).**

7. **Replace the computer cover, reconnect the computer and peripherals to their power sources, and turn them on.**

8. **Have the user assign a new administrative and/or user password.**

   To assign a new administrative password using the system setup program, see "Assigning an Administrative Password" in Chapter 4 of the system *User's Guide*. To assign a new administrative password using the system configuration utility, see "Security Subsystems Group" in Chapter 5 of the system *User's Guide*.

   To assign a new user password using the System Setup program, see "Assigning a User Password" in Chapter 4 of the system *User's Guide*. To assign a new user password using the system configuration utility, see "Security Subsystems Group" in Chapter 5 of the system *User's Guide*.

Abbreviations and Acronyms

Abbreviation or Acronym	Description
A	ampere(s)
AC	alternating current
ADC	analog-to-digital converter
ADI	Autodesk Device Interface
AI	artificial intelligence
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASIC	application-specific integrated circuit
BASIC	Beginner's All-Purpose Symbolic Instruction Code
BBS	bulletin board service
BIOS	basic input/output system
bpi	bits per inch
bps	bits per second
BTU	British thermal unit
BZT	*Bundesamt fur Zulassungen in der Telekommunikation*
C	Celsius
CCFT	cold cathode fluorescent tube
CD	compact disc

Abbreviation or Acronym	Description
CD-ROM	compact disc read-only memory
CGA	color graphics adapter
cm	centimeter(s)
CMOS	complementary metal-oxide semiconductor
C.O.D.	collect on delivery
cpi	characters per inch
cpl	characters per line
CPU	central processing unit
DAC	digital-to-analog converter
DASH	Dell Advanced SCSI Host
DAT	digital audio tape
dB	decibel(s)
dBA	adjusted decibel(s)
DC	direct current
DIN	*Deutsche Industrie Norm*
DIP	dual in-line package
DMA	direct memory access
DOC	Department of Communications (in Canada)
dpi	dots per inch

Abbreviation or Acronym	Description
DRAM	dynamic random-access memory
DS/DD	double-sided double-density
DS/HD	double-sided high-density
DSA	Dell SCSI Array
ECC	error correction code
EDO	extended-data out
EGA	enhanced graphics adapter
EIDE	enhanced integrated drive electronics
EISA	Extended Industry-Standard Architecture
EMI	electromagnetic interference
EMM	expanded memory manager
EMS	Expanded Memory Specification
EPP	Enhanced Parallel Port
EPROM	erasable programmable read-only memory
ESD	electrostatic discharge
ESDI	enhanced small-device interface
F	Fahrenheit
FAT	file allocation table
FCC	Federal Communications Commission
FIFO	first-in first-out
ft	feet
FTP	file transfer protocol
g	gram(s)
G	gravities

Abbreviation or Acronym	Description
GB	gigabyte(s)
GUI	graphical user interface
h	hexadecimal
HIP	Hardware Instrumentation Program
HMA	high memory area
HPFS	High Performance File System
Hz	hertz
I/O	input/output
IC	integrated circuit
ID	identification
IDE	integrated drive electronics
IRQ	interrupt request
ISA	Industry-Standard Architecture
JEIDA	Japanese Electronic Industry Development Association
K	kilo- (1024)
KB	kilobyte(s)
KB/sec	kilobyte(s) per second
Kbit(s)	kilobit(s)
Kbit(s)/sec	kilobit(s) per second
kg	kilogram(s)
kHz	kilohertz
LAN	local area network
lb	pound(s)
LCD	liquid crystal display
LED	light-emitting diode

Abbreviation or Acronym	Description
LIF	low insertion force
LN	load number
LIM	Lotus/Intel/Microsoft
lpi	lines per inch
m	meter(s)
mA	milliampere(s)
mAh	milliampere-hour(s)
MB	megabyte(s)
MBR	master boot record
MDA	monochrome display adapter
MGA	monochrome graphics adapter
MHz	megahertz
mm	millimeter(s)
ms	millisecond(s)
MS-DOS	Microsoft Disk Operating System
MTBF	mean time between failures
mV	millivolt(s)
NIC	network interface controller
NiCad	nickel cadmium
NiMH	nickel-metal hydride
NMI	nonmaskable interrupt
ns	nanosecond(s)
NTFS	NT File System
NVRAM	nonvolatile random-access memory
OS/2	Operating System/2
OTP	one-time programmable

Abbreviation or Acronym	Description
PAL	programmable array logic
PCI	Peripheral Component Interconnect
PCMCIA	Personal Computer Memory Card International Association
PGA	pin grid array
POST	power-on self-test
ppm	pages per minute
PQFP	plastic quad flat pack
PS/2	Personal System/2
PVC	polyvinyl chloride
QIC	quarter-inch cartridge
RAM	random-access memory
RAMDAC	random-access memory digital-to-analog converter
REN	ringer equivalence number
RFI	radio frequency interference
RGB	red/green/blue
ROM	read-only memory
rpm	revolutions per minute
RTC	real-time clock
SCSI	small computer system interface
sec	second(s)
SIMM	single in-line memory module
SMB	server management bus
SNMP	simple network management protocol
SRAM	static random-access memory

Abbreviation or Acronym	Description
SVGA	super video graphics array
TFT	thin film transistor
tpi	tracks per inch
TSR	terminate-and-stay-resident
TV	television
UL	Underwriters Laboratories
UMB	upper memory block
UPS	uninterruptible power supply
USOC	Universal Service Ordering Code
V	volt(s)
VAC	volt(s) alternating current
VDC	volt(s) direct current
VDE	*Verband Deutscher Elektro-techniker*
VESA	Video Electronics Standards Association
VGA	video graphics array
VLSI	very-large-scale integration
VRAM	video random-access memory
W	watt(s)
WH	watt-hour(s)
XMM	extended memory manager
XMS	eXtended Memory Specification
ZIF	zero insertion force

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